MOJAVE DESERT
AIR QUALITY MANAGEMENT DISTRICT

Searles Valley
PM_{10} Plan

San Bernardino County Portion of the Searles Valley Planning Area

Adopted
June 28, 1995

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SEARLES VALLEY PM_{10} PLAN

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EXECUTIVE SUMMARY

INTRODUCTION

The Searles Valley Planning Area (SVPA) is located in eastern California and lies in portions of two air basins, the Great Basin Valleys and the Southeast Desert. The SVPA includes the southeast portion of Inyo County, the northeastern portion of Kern County and the northwestern portion of San Bernardino County. The SVPA has been designated by the United States Environmental Protection Agency (USEPA) as a Group I nonattainment area for fine particulates matter (PM_{10}) under the previous federal Clean Air Act requirements. Each county, since being classified nonattainment for PM_{10}, has had one or more violations of the National Ambient Air Quality Standards (NAAQS). Under Section 110 of the federal Clean Air Act, a State Implementation Plan (SIP) must be prepared and submitted to the USEPA by November 15, 1991. Therefore, three Air Pollution Control Districts (Great Basin Unified, San Bernardino County, now Mojave Desert Air Quality Management District (MDAQMD), and Kern County) jurisdictions cover the SVPA. Each air district was required to submit PM_{10} SIP revisions for their portions of the SVPA.

PURPOSE OF THE SEARLES VALLEY PM_{10} SIP

The purpose of this PM_{10} SIP is to present a comprehensive strategy to control and reduce locally generated PM_{10} emissions in the San Bernardino County portion of the SVPA (referred to as the Trona Subplanning area). The listed control measures will be implemented by the Mojave Desert Air Quality Management District (MDAQMD). These control efforts are intended to enable the Trona Subplanning area to attain the NAAQS by December 31, 1994.

FEDERAL CLEAN AIR ACT MANDATES

On November 15, 1990, the Clean Air Act Amendments (FCAA) of 1990 were enacted. Pursuant to Section 188(a) of the FCAA, the SVPA as a Group I nonattainment area was designated as "Moderate" by operation of law. This required the SIP to be submitted to the USEPA by November 15, 1991. The SIP for a "Moderate" area must contain "reasonably available control measures" (RACM) to be implemented unless their effect on a source is insignificant. In addition, the USEPA mandates the application of RACM to existing sources through the adoption, at a minimum, of reasonably available control technology (RACT). Also, in the preparation of a SIP, consideration must be given to any control methods suggested by the Air Resources Board (ARB) and/or the general public. Information on control costs must be provided only to the extent such data is needed to document the infeasibility of a control strategy, which is disallowed on the basis of prohibitive costs. Finally, any RACM which is not selected for implementation must be supported by a justification of reasons.

PM_{10} STANDARD AND HEALTH EFFECTS

PM_{10} refers to particulate matter less than 10 microns in diameter. The NAAQS for PM_{10} was established July 1, 1987 at 150 micrograms per cubic meter ($\mu g/m^3$) for the 24-hour standard and 50 $\mu g/m^3$ for the annual average standard. These standards were set at levels designed to protect the health of humans who are sensitive to exposure to fine particles. PM_{10} poses a hazard to human health, because such fine particles are easily inhaled and retained in the deepest parts of the lungs. Children, the elderly, those suffering from influenza, and those with cardiovascular and respiratory problems are especially suspectable to increased respiratory problems and illnesses due to exposure to high levels of PM_{10}. This air pollutant is not only a nuisance and an irritant, some sources of PM_{10} may emit particles which contain toxic and carcinogenic compounds which can increase the threat to human health. In addition, certain sizes of PM_{10} can contribute to the degradation of atmospheric visibility and pose a safety hazard during extremely dusty conditions.

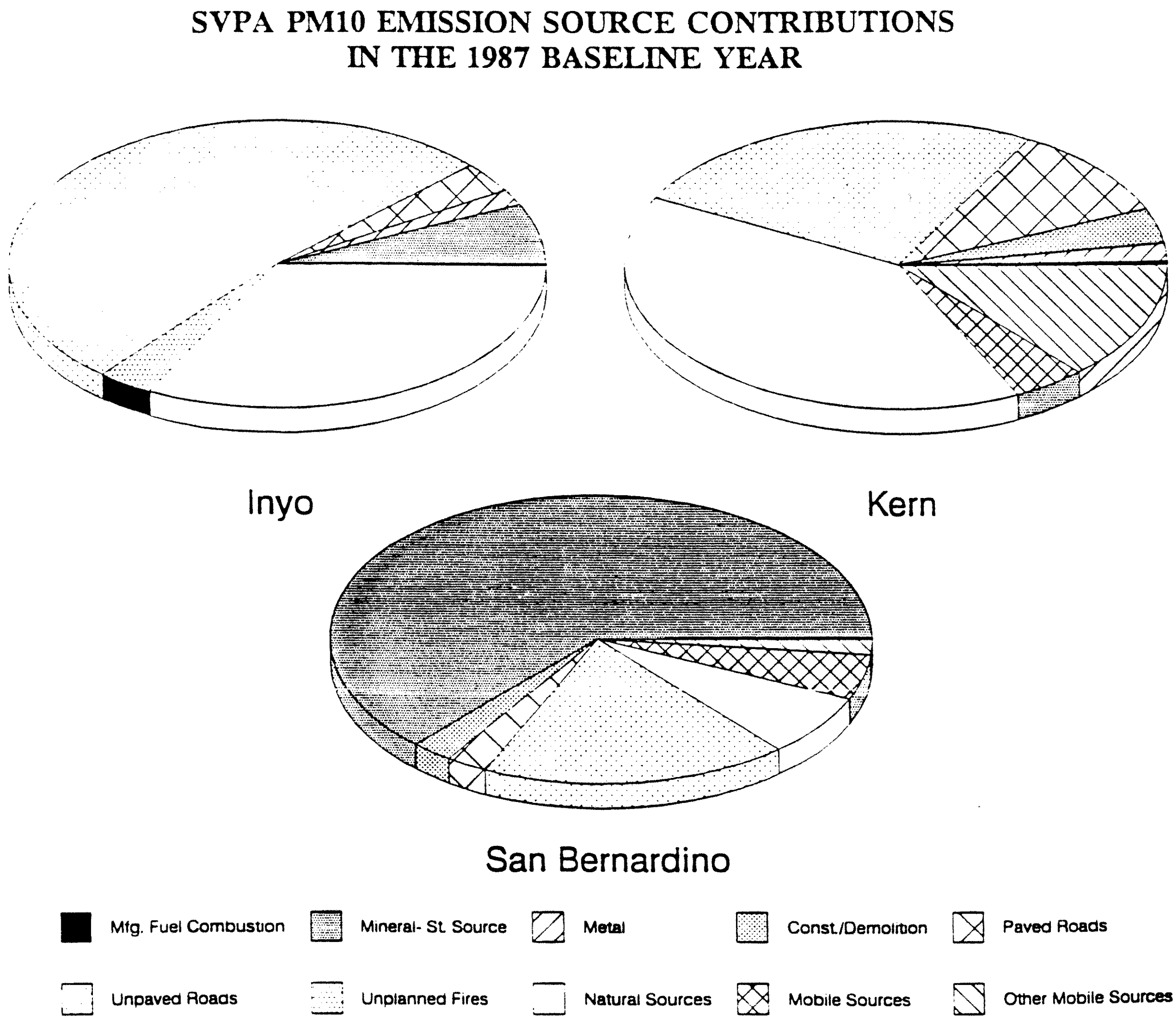
SOURCES CONTRIBUTING TO PM_{10} PROBLEM

PM_{10} in the ambient atmosphere can be caused by both human activities and environmental factors. This plan is focused on the control of PM_{10} emissions which are the result of human activities within the SVPA. Such emissions arise from the disturbance of the desert soil crust by construction and demolition activities which includes but is not limited to grading, cut and fill operations, drilling and blasting and vehicular traffic of construction equipment. While traditional sources such as industrial facilities can contribute PM_{10} through smoke stack emissions, fugitive dust emitted from processes, paved/unpaved road travel and open area wind erosion on the facility grounds. In addition, the SVPA includes a large military base which represents a unique contributor of PM_{10} emissions, not only arising from traditional sources, but also results from large scale testing of defense systems along with research and development activities. Also adding to the pollutant burden in the SVPA is the contribution of PM_{10} emissions by open area wind erosion of the soil which has been disturbed. This results from indiscriminate land clearing, off-road vehicle use, laying of pipelines, etc.... Another significant category would be vehicular travel on both paved and unpaved roads.

It is not within the purview of this PM_{10} SIP to formulate a control strategy for the undetermined amount of transport of PM_{10} from neighboring air basins. The emission inventory gives an accounting of total PM_{10} emissions locally generated by the larger sources in the Trona Subplanning area. This shows that in the year 1990, there was an estimated 9.18 tons per day (tpd) of PM_{10} emissions in the Trona Subplanning area. The pie charts illustrated in Figure 1-1 depicts the major source contributions of PM_{10} emissions in the 1987 baseline year.

FIGURE 1-1

SVPA PM_{10} EMISSION SOURCE CONTRIBUTIONS IN THE 1987 BASELINE YEAR



AIR QUALITY DATA ON PM_{10} IMPACTS

There has been extensive monitoring of PM_{10} in the SVPA with as many as five sites operating at one time. Exceedances of the 24-hour NAAQS for PM_{10} were recorded on 15 occasions in the Trona area. It must be noted that many of the monitoring sites measured PM_{10} samples on a once every sixth day regime rather than every day. Based on the data observed, it is apparent that multiple air pollution episodes occur and that the one-day-in-six day sampling may miss some PM_{10} violations. Based on past violations, it has been estimated that potential exceedances may occur as much as 6-24 times in the SVPA.

To date, the SVPA has not exceeded the 50 $\mu g/m^3$ annual average NAAQS for PM_{10}. While the annual average trend for the three year period from 1988-1990 indicates annual average values of 45.9 $\mu g/m^3$ for Trona.

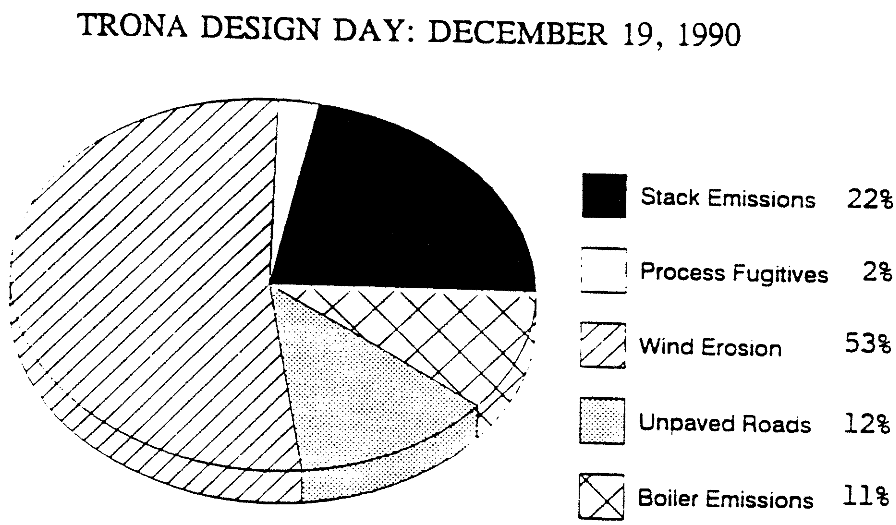
DESIGN DAY SCENARIOS

To devise an appropriate control strategy for the SVPA, an analysis was undertaken to examine specific PM_{10} exceedances which qualified as "design-days". In turn, the selection of a design day along with the emissions inventory for the SVPA determines the resultant PM_{10} "design value" from which a reduction must be made to achieve the federal PM_{10} standard. Because of varying localized conditions, it was decided that the SVPA be broken into subplanning areas (Trona, China Lake and Coso Junction) in order to focus on the localized contributors to the PM_{10} problem.

The Trona Subplanning area utilized December 19, 1990 as the design day. On this date, a station in the Trona Subplanning area recorded PM_{10} concentrations of 228 $\mu g/m^3$, which is about 52 percent over the 24-hour federal PM_{10} standard of 150 $\mu g/m^3$. The pie chart below (Figure 2-1) reflects the respective contributions from stationary sources (both process fugitives and stack emissions), and unpaved road emissions. It can be seen that the majority of emissions arise from open areas subject to wind erosion. Approximately 53 percent of emissions are generated from wind erosion of open areas, while combined stationary sources account for about 35 percent of the PM_{10} generated locally in the Trona Subplanning area. Only 12 percent of emissions can be attributed to unpaved roads. The control strategy devised for the Trona Subplanning area was devised to address the major category of sources contributing PM_{10} emissions.

FIGURE 2-1

TRONA DESIGN DAY: DECEMBER 19, 1990



PM_{10} CONTROL MEASURES

The plan will reduce PM_{10} emissions through a set of control measures tailored to meet the specific problems of the SVPA. Selected control strategies focus on controlling and reducing local PM_{10} from sources such as industrial facilities, military operations, open areas, construction activities, paved and unpaved roads. Included are primary control measures (CM's) which are those that the USEPA has recommended for inclusion in SIP. While alternate control measures (A-CM) are those methods, techniques, etc... that have been suggested by ARB or successfully used implemented in other air districts. The following broad strategies will form the foundation for the PM_{10} control efforts that will be refined during the rule making process.

Industrial Point Source Control

1. New Source Review Program

2. Control Requirements (RACT/BACT) for Existing and New Facilities

3. Enhanced Enforcement Program

4. Enhanced Variance Review

Industrial Process Fugitives: Primary Control Measures

Control No.	Control Methods/Work Practices
CM-12	Require Dust control measures for storage piles.
A-CM	Install Add-On Particulate Matter Control Equipment on the process line or series of operational processes.
A-CM	Enclose the process line, to reduce likelihood of wind-borne fugitives escaping the processing operation.

Unpaved Industrial Roads: Primary Control Measures

Control No.	Control Methods/Work Practices
CM-1	Pave, vegetate or chemically stabilize access points where unpaved traffic surfaces adjoin paved roads.
CM-5	Prohibit permanent unpaved haul roads, and parking or staging areas at commercial, municipal, industrial or military facilities.
CM-6	Develop traffic reduction plans for unpaved roads.
CM-10	Pave or chemically stabilize unpaved roads.

CM-11	Pave, vegetate, or chemically stabilize unpaved parking areas.

Paved Industrial Roads: Primary Control Measures

Control No.	Control Methods/Work Practices
CM-2	Require dust control plans for construction or land clearing projects (construction of paved roads).
CM-4	Provide rerouting or rapid clean-up of temporary sources of mud and dirt on paved roads.
CM-9	Require curbing and pave or stabilize shoulders of paved roads.
CM-13	Provide for storm water drainage to prevent water erosion onto paved roads.

Paved Industrial Roads: Alternate Control Measure

Control No.	Control Methods/Work Practices
A-CM	Surface cleaning of the roadways to prevent silt loading.

Mobile Sources: Alternate Control Measures

Control No.	Control Methods/Work Practices
A-CM	Reduce traffic volume, vehicle miles traveled or trips per day on both paved and unpaved roads.
A-CM	Require trucks to maintain two feet of freeboard (eg. the distance between the top of the load and the top of the truck bed).

Construction/Demolition Activities: Primary Control Measures

Control No.	Control Methods/Work Practices
CM-2	Require dust control plans for construction or land clearing projects (including road projects).
CM-3	Require haul trucks to be covered.
CM-4	Provide rerouting or rapid clean-up of temporary sources of mud and dirt on unpaved roads.
CM-12	Require dust control measures for material storage piles.
CM-13	Provide for storm water drainage to prevent water erosion onto paved roads.

CM-14 Require revegetation, chemical stabilization, or other abatement of wind erodible soil.

Construction/Demolition Activities: Alternate Control Measures to Modify Development Practices

Control No.	Control Methods/Work Practices
A-CM	Do not allow grading of lot or parcel until a building permit has been issued.
A-CM	Wherever possible, maintain the natural topography to eliminate the need for extensive land clearing, blasting, ground excavation, grading and cut and fill operations.
A-CM	Wherever feasible, require parking lots and paved roads (including access roads) to be constructed first.
A-CM	In a multi-phase project, build the first phase upwind (based on area's prevailing wind direction) of the remaining project, whenever feasible.
A-CM	Establish wind breaks, either man-made structures or vegetative on the perimeter of development sites when a site is left with unprotected soil for an extended period.

Construction/Demolition Activities: Alternate Control Measures to Modify Work Practices

Control No.	Control Methods/Work Practices
A-CM	All grading activities would cease during periods of high wind, greater than a specified mile per hour limit.
A-CM	Require trucks hauling dirt, sand, soil or other materials capable of fugitive.
A-CM	As soon as construction and initial landscaping are completed, the soil should be treated with chemical soil and dust binders, followed by seeding and/or restoration of vegetation.
A-CM	Avoid soil/mud deposition by truck on roadways beyond facility boundaries.

Unpaved Roads: Primary Control Measures

Control No.	Control Methods/Work Practices
A-CM	Pave, vegetate or chemically stabilize access points where unpaved traffic surfaces adjoin paved roads.

CM-5 Prohibit permanent unpaved haul roads, and parking or staging areas at commercial, municipal, industrial or military facilities.

CM-10 Paving or chemically stabilizing the unpaved areas.

CM-11 Pave, vegetate, or chemically stabilize unpaved parking areas.

Unpaved Roads: Mitigation Measures

For roadways with moderate to high vehicular use:

1. Develop traffic reduction plans for unpaved roads.

2. Lower the vehicle speed limit on unpaved roads and implement a routine proactive enforcement program to monitor compliance with the speed limits.

3. Limit the size and weight of vehicles permitted on certain unpaved road or areas.

4. Surface the roadway with a material of lower silt content, coupled with a planned maintenance program.

For roadways with low vehicular use:

1. For temporary construction sites or special events with vehicular maneuvering areas, use wet suppression (eg. watering the road or parking lot).

2. Use chemical stabilization on the roadway surface.

3. Use physical stabilization of the soil.

4. Plant windbreaks next to the roadway.

Preventative Control Measures

Control No.	Control Methods/Work Practices
CM-4	Provide rerouting or rapid clean-up of temporary sources of dust on paved roads.
CM-9	Require curbing and pave or stabilize shoulders of paved roads.
CM-13	Provide for storm water drainage to prevent water erosion onto paved roads.

Paved Roads: Alternate Control Measures

Control No.	Control Methods/Work Practices
A-CM	Surface cleaning of the roadways to prevent silt loading;

Open Area Sources: Primary Control Measures

Control No.	Control Methods/Work Practices
CM-7	Limit use of recreational vehicles on open land.
CM-14	Require revegetation, chemical stabilization, or other abatement of wind erodible soil.
CM-15	Rely upon the soil conservation requirements of the Food Security Act to reduce emissions from agricultural operations.

CONTROL STRATEGY IMPLEMENTATION IN THE SVPA

District Responsibilities

The primary responsibility for air quality planning resides with the MDAQMD. MDAQMD may delegate its authority to local governments for the development and adoption of ordinances, statutes or guidelines to accomplish the goals of this plan. In the event, the local jurisdictions are unable to comply with developing and implementing appropriate and enforceable provisions to implement these control measures, MDAQMD will retain the authority to enforce rules and regulations that will be necessary to meet the goals of the plan. Table I-1 shows the selected control measures for the Trona Subplanning area.

TABLE I-1

SELECTED CONTROL STRATEGIES FOR THE TRONA SUBPLANNING AREA WITHIN THE SEARLES VALLEY PLANNING AREA

Control Strategy Selected	Authority	Schedule	MDAQMD
Enhanced Variance Review	Policies	12/91	X
New Source Review Permit Prog.	Regulation	6/92	X
Enhanced Enforcement Program	Policies	6/92	X
Const. & Demolition Controls	Rules	6/92	X
Process Fugitive Controls	Rules	12/92	X
Wind Erosion Controls	Rules	12/92	X
Paved Road Controls	Rules	12/92	X
Open Area Source Controls	Rules	12/92	X
Unpaved Road Controls	Rules	6/93	X
PM Control Devices	Regulation	12/93	X

Local Government Responsibilities

Local Governments, by their authority over land use issues will be a critical partner in the successful implementation of the control measures contained herein. It is expected that many of these provisions may be adopted as ordinances, statutes, guidelines, and building standards by the affected jurisdictions. In addition, other government entities such as the Bureau of Land Management (BLM) may also be critically involved in this process of implementation of the control measures. Along with implementation, there will be the need to monitor compliance and progress of the programs which affect the responsibilities of the local agencies. The cooperation of the City/County Department of Roads/Transportation and Building Departments will be important players in the process of mapping an effective strategy for PM_{10} control on unpaved/paved roads.

DEMONSTRATING ATTAINMENT AND CONTINGENCY MEASURES

The control strategy implemented must be sufficient to achieve the necessary level of emission reductions resulting in attainment of NAAQS for PM_{10}. Table I-2 details the estimated amount of emission reductions needed in the Trona Subplanning Area.

TABLE I-2

SUMMARY OF EMISSION REDUCTIONS REQUIRED FOR ATTAINMENT BY 1994

Source Category	Const/Demo Emissions	Process Fugitives	Wind Erosion	Unpaved Roads	BLM Roads
Trona* Percent Reduction	20	20	28	40	20

* Trona Subplanning Area would include stationary sources that lie both in the MDAQMD and Great Basin Air Pollution Control District portions of the SVPA.

By implementing the degree of controls identified above, it will allow the air districts to sufficiently reduce PM_{10} emissions generated by local sources in order to reach attainment. Specifically, it has been estimated that the resultant ambient PM_{10} concentration in Trona (typical of the December 19, 1990 design-day) may result in an ambient PM_{10} concentration as low as 144.8 $\mu g/m^3$. Thus, the Trona Subplanning area can reach attainment of the federal PM_{10} NAAQS by December 31, 1994 as demonstrated by the Linear Rollback Projections.

CHAPTER I

INTRODUCTION

1.1 Purpose and Requirements

On July 1, 1987, USEPA promulgated new NAAQS for particulate matter (PM). In promulgating the new standard, USEPA changed the indicator for PM from Total Suspended Particulates (TSP) to those particles with an aerodynamic diameter less than or equal to a nominal 10 micrometers (PM_{10}); replaced the 24-hour TSP standard of 260 ug/m^3 with a 24-hour PM_{10} standard of 150 ug/m^3; and no more than one expected exceedance per year. The TSP annual standard of 75 ug/m^3, annual geometric mean, was replaced with a PM_{10} annual standard of 50 ug/m^3, expected annual arithmetic mean. These new standards became effective on July 31, 1987. These changes were based on health studies which demonstrates that smaller PM_{10} particles can penetrate deep into the respiratory tract leading to a variety of symptoms and respiratory diseases.

Federal Clean Air Act And Amendments

Background

Section 110(a)(1) of the 1977 FCAA, requires that each state adopt and submit a SIP for nonattainment areas providing for the attainment and maintenance of the primary NAAQS as expeditiously as practicable, but no later than 3 years from the date USEPA approves the standard.

Under the 1977 FCAA, PM_{10} plans were required to be submitted to USEPA in 1988, but in 1988 the USEPA issued a guidance policy on the long-term nonattainment of the PM_{10} standards. Recognizing the substantial resources required to develop the SIP and the difficulties in achieving compliance by the prescribed date, in the summer of 1990, USEPA stated that the SIP must be submitted no later than the end of 1991. In addition to setting a new deadline for submittal of the PM_{10} SIP, USEPA also adopted a policy to prioritize SIP development in those areas most likely to violate the PM_{10} standards. An element of the "most likely" determinations is the extent to which PM_{10} ambient air quality data was available for each of the areas. In cases where PM_{10} data was not available, TSP ambient air quality data was used to estimate PM_{10} values.

To assist in prioritizing the planning process, USEPA established three geographical area groups: Group I - Those areas having a probability of 95 percent or greater of not attaining the standard; Group II - Those areas having a probability of between 20 and 95 percent of not attaining the standards; and Group III - Those areas within a probability of less than 20 percent of not attaining the standards. In applying this policy, USEPA reviewed TSP and PM_{10} ambient monitoring data where available and, in cooperation with the states, used this data to classify areas preliminarily as Group I, II, or III.

On November 15, 1990, the 1990 FCAA was enacted. PM_{10} areas meeting the standards of section 107(d)(4)(B) of the 1990 FCAA were designated nonattainment by Operation of the Law. These areas included all former Group I air basins, and any other areas violating the PM_{10} standards prior to January 1, 1989. Section 188(a) of the 1990 FCAA provided for designation of PM_{10} nonattainment as either

"Moderate" or "Severe." Hence, areas such as the Searles Valley, which were classified as Group I prior to adoption of the 1990 FCAA, are designated by Operation of the Law as "moderate" by the above-referenced sections. Moderate areas must submit a SIP by November 15, 1991 (Section 189(a)(2)), and are required to attain compliance with the standards as expeditiously as practicable no later than December 31, 1994. Section 188(b)(1) authorizes USEPA to reclassify Moderate areas as Serious if either one of the following conditions should occur:

1. Before the applicable Moderate area attainment date, if at any time, USEPA determines the area cannot "practicably" attain the PM_{10} NAAQS by this attainment date; or

2. Following the passage of the applicable Moderate area attainment date, USEPA determines the area has failed to attain the PM_{10} NAAQS.

The analysis presented in this plan estimates attainment of PM_{10} NAAQS by the end of 1994. If attainment is not met by this date, the SVPA will be reclassified "Serious" and must attain compliance with the standards as expeditiously as practicable, but no later than December 31, 2001 (Section 188(c)(2)).

In response to Group I designation, a plan development process will evaluate PM_{10} emissions for industrial, area and mobile air pollution sources. From that evaluation, appropriate control measures will be proposed. This plan describes preliminary response, outlines the work plan, identifies project requirements, costs, and schedule. The preparation of the SVPA PM_{10} Plan was coordinated by the San Bernardino County APCD with contributions by Kern County APCD and Great Basin Unified APCD, both of which had equal responsibilities in reviewing and ensuring the content and quality of the Plan. Upon completion of the Final Plan, it was subsequently submitted to USEPA, and ARB on November 15, 1991 after approval by the Governing Board, which then satisfied the requirement for Plan submittal.

The development plan is divided into sections which describe the SVPA, the climate and air quality in the SVPA, the administrative considerations of the plan, and a proposed workplan to develop the PM_{10} SIP for the SVPA.

1.2 Plan Development and Adoption Process

The SVPA encompasses portions of three county areas, which include Kern, Inyo, and San Bernardino counties, and affects three different air districts which have jurisdiction over the SVPA. The Kern County APCD has responsibilities over the Kern County portion of the SVPA; the Great Basin APCD has jurisdiction over the portions within Inyo county; and the MDAQMD has jurisdiction over the desert portion of San Bernardino County which includes the Trona Subplanning area portion within the SVPA. Recognizing the duplication of efforts by the various agencies in developing the PM_{10} Plan for their respective portions of the SVPA, these agencies decided to unify their efforts in preparing a combined PM_{10} Plan, which also reflected the unique feature of the respective subplanning areas.

Following the decision to prepare a joint Plan, the SVPA PM_{10} Task Force was formed with the San Bernardino County APCD designated as the Lead Agency in preparing the plan. The Task Force met on a regular basis until the plan was completed.

As part of the Plan development process, a scoping meeting was held in the City of Ridgecrest on August 15, 1991. The scoping meeting was attended by about 20 concerned citizens and industry representatives. Information obtained from the workshop was incorporated into this document. The SVPA PM_{10} Plan and the CEQA document were released on September 30, 1991, for a 30 day public comment period. Within this review period, a public workshop was held to discuss the Plan and the CEQA document, which focused primarily on the proposed control measures. Input from the public workshop was analyzed and incorporated as appropriate into the SVPA PM_{10} Plan and the CEQA document. The SVPA PM_{10} SIP was adopted by the San Bernardino County APCD Governing Board on November 25, 1991. The MDAQMD adopted amendments to the SVPA PM_{10} SIP on September 22, 1993 and May 24, 1995.

Implementation

The SVPA PM_{10} Plan is developed to uniformly address PM problems in the SVPA. The implementation of the plan will require further evaluation by the MDAQMD to determine the most appropriate method or specific measures that need to be applied locally to accomplish the goals of the SVPA PM_{10} Plan.

As an implementation tool, the plan focuses on mitigation measures at the local government level. Unlike other air quality attainment plans which rely heavily on rule making, this plan relies on the adoption of local government ordinances to achieve the plan's objectives. The MDAQMD will provide extensive technical support as needed, and act as the implementing agency only in the event the local implementation program is not successful. Because the Searles Valley PM_{10} problem is a locally-generated problem, this approach allows local government, industry, and citizens to actively participate in improving the SVPA's air quality.

1.3 Impacts of PM_{10} on Humans and Property

Adverse Health Effects

Both USEPA and the State of California have established ambient air quality standards for PM_{10}. The California 24-hour and annual average standards, which are considerably more stringent than the federal standards, were set with the intention of:

> "Prevention of excess deaths from short-term exposures and of exacerbation of symptoms in sensitive patients with respiratory disease. Prevention of excess seasonal declines in pulmonary function, especially in children." (CAC, Title 17, Section 70200[1])

In developing these standards many sources of health effects data were considered including epidemiology studies, clinical studies of controlled human exposures, animal toxicology, short-term bioassays, and biochemical studies. The development of the final standards focused primarily on epidemiological studies.

Acute Health Effects Considerations

In developing a short-term (24-hour) health-based standard for PM_{10}, USEPA considered health effects reported in the literature including mortality and various morbidity[a] indicators such as reduced lung function.

In evaluating this data, USEPA concluded that:

> "Convincing evidence indicates that relative small but statistically significant increases in the risk of mortality exist at British Smoke* (but not SO_2) levels below 500 ug/m^3, with no indications of any specific threshold levels having been demonstrated at lower concentrations of British Smoke (e.g., at $\leq$ 150 ug/m^3). However, precise quantitative specification of the lower PM levels associated with mortality is not possible, nor can one rule out potential contributions of other possible confounding variables at these low PM levels" (USEPA, 1986[1]).

Mortality effects were considered in the development of a short-term standard, although they were not used to derive a specific threshold for effects.

• Mortality refers to death and morbidity refers to disease and illness.
* This PM indicator was widely used in Britain and European studies.

Morbidity studies, which were most important in the development of the 24-hour standard for PM_{10} were conducted by Dockery, et al. (1982) and Dassen et al. (1986[3]). These studies showed a decrease in lung function (forced vital capacity and forced expiratory volume) following episodes of particulate pollution. The changes were small, but significant, and persisted for two to three weeks. In the Dockery study, there was a higher response in some children indicating that there may be sensitive subgroups in the population.

Chronic Health Effects Considerations

Mortality - Several studies have noted a correlation between mortality rates and long-term exposure to particulate pollution levels (USEPA 1986[4]). These studies have raised concerns for possible premature mortality due to particulate pollution. Although these studies have been given less weight in the setting of standards for PM_{10} due to methodological shortcomings, studies of this type were taken into consideration in the evaluation of the margin of safety for the standard.

Morbidity - The data which were most influential in the development of the annual average PM_{10} standard were published by Ware et al. (1986[5]) involving about 10,000 six-to-nine year old children in six U.S. cities. The study reported an association between particulate pollutant levels and reports of coughing, bronchitis, and respiratory illness.

Because of the limited scope and number of longer-term quantitative studies, qualitative data from epidemiological and animal studies were also considered in the development of the standard. These studies support the concerns, especially for sensitive groups (asthmatics, bronchitic individuals, and the elderly).

Dust-Related PM_{10}

The Federal and State PM_{10} standards are based on total particle mass without consideration of the chemical components. Many of the underlying health studies have not analyzed the chemical components of the airborne particulates. Therefore, it is often not clear which components of airborne particulate are responsible for a given health effect, though it is generally assumed that particles associated with urban pollution are most important.

Reports in the literature indicate that heavy exposure to desert dust maybe harmful to human health. A syndrome referred to as "desert lung syndrome" [nonoccupational pneumoconiosis] has been described in the literature. Cases have been reported from the Sahara, Arabian, and Negev deserts. The syndrome is characterized by deposits of sandy dust in the lungs. There is some evidence that these deposits may be associated with changes in lung function, however, data addressing this issue is very limited. Desert dust also contains crystalline silica. Exposure to this compound has been associated with adverse health effects in occupational settings (i.e., fibrosis, silicosis). In addition, Valley Fever Spores may also be present in desert dust, thus fugitive dust emissions may contribute to an increased incidence of Valley Fever infections in exposed populations[6].

FIGURE 2-2

SOUTHEAST DESERT AIR BASIN

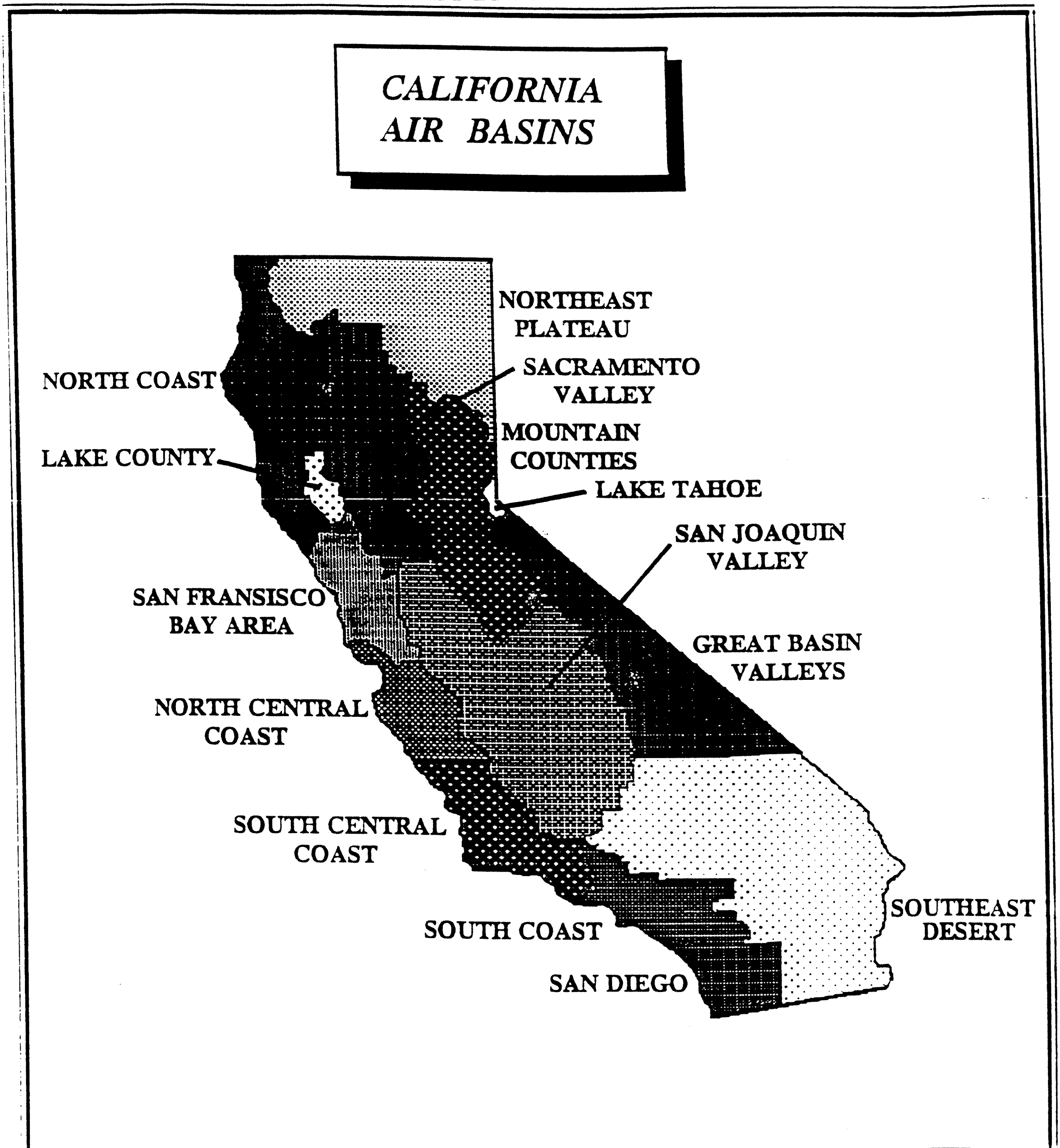
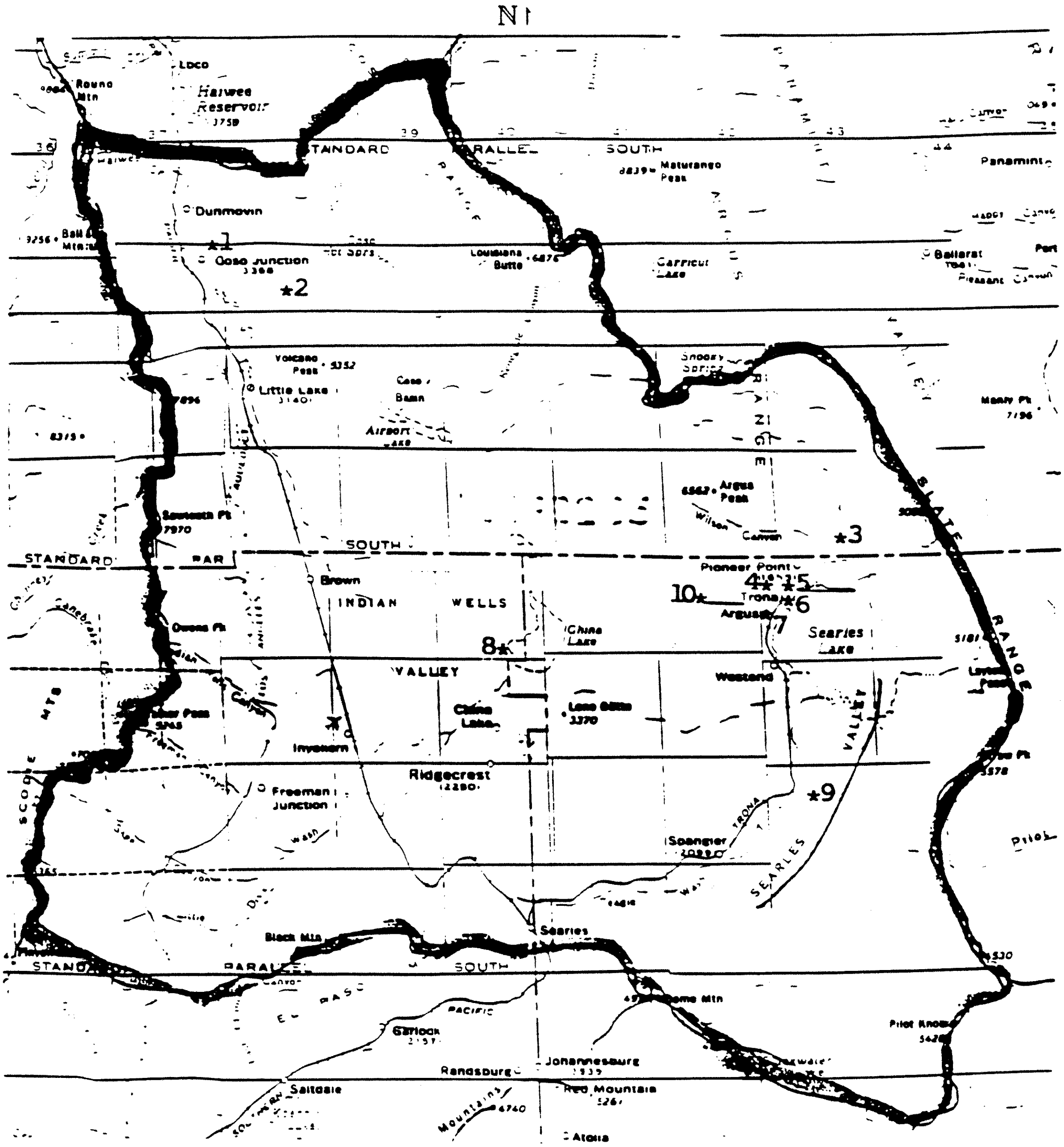


FIGURE 2-3

SEARLES VALLEY PLANNING AREA



#1	Coso Junction Station	#6	Trona Station
#2	Coso, 10 Miles East, Station	#7	ACE-2 Station
#3	ACE-6 Station	#8	China Lake Station
#4	ACE-4 Station	#9	ACE-5 Station
#5	ACE-3 Station	#10	ACE-1 Station (inactive)

Climate and Air Quality

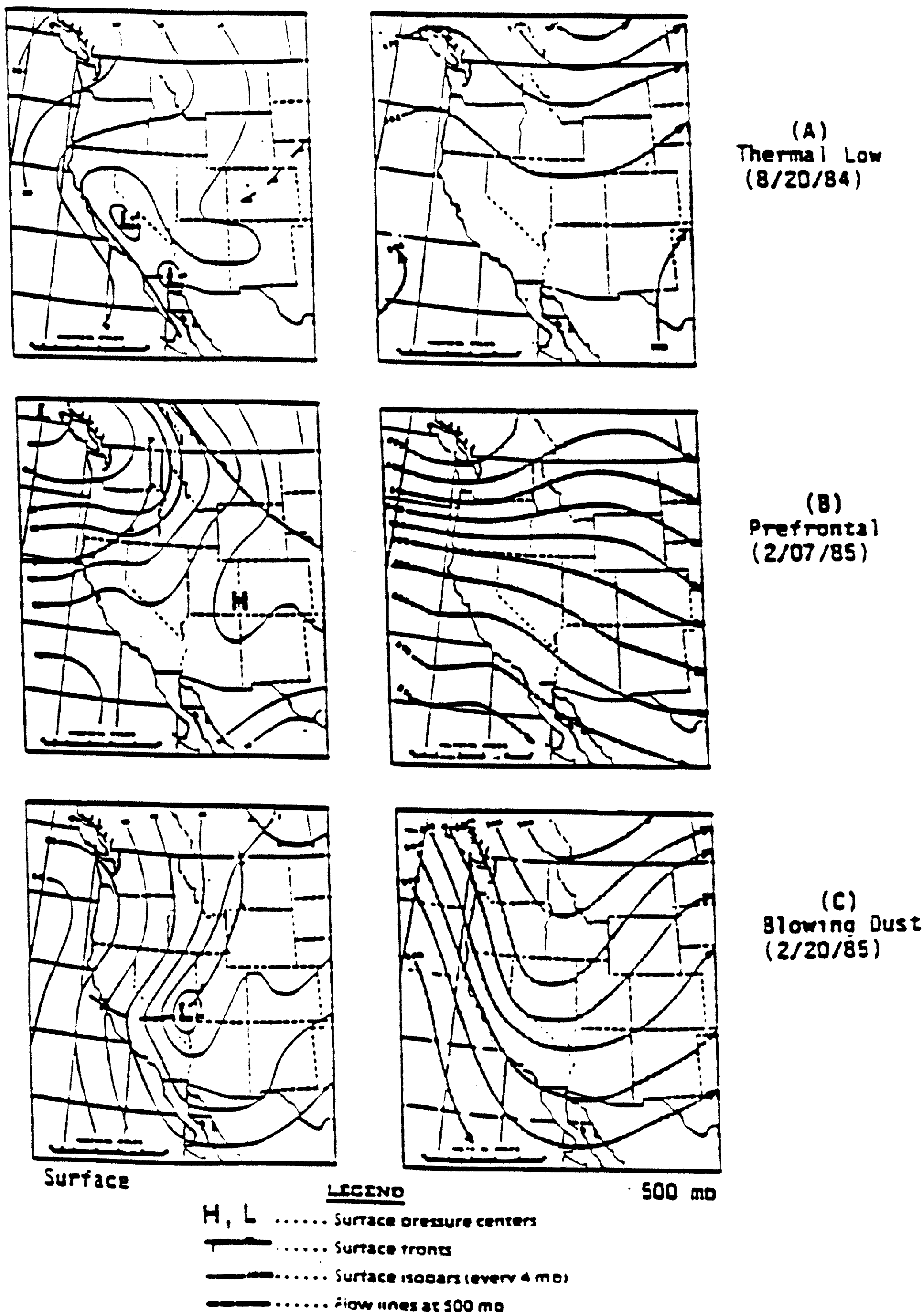
The SVPA is arid in nature with the annual precipitation for most areas ranging from 2 to 5 inches per year. Temperatures range from an average of 30^0 F in January to an average maximum of 108° in July. In the RESOLVE study[7], it was noted that China Lake experienced great variation in daily temperature extremes, probably due to its location in a dry lake bed where the effects of daytime heating and nighttime drainage are both maximized. The SVPA contains both the dry lake bed in China Lake and one in the Searles Valley.

Air quality in the SVPA can be generally characterized as good; attributable to the relative lack of industrial development, small population and the remoteness of the area from major urban centers. With the exception of PM_{10}, ambient air monitoring data indicate that there are no exceedances of the NAAQS. With respect to the PM_{10} Standard, the 24-hour standard was violated three times in Trona in 1985. Actual exceedances could be greater because PM_{10} sampling is performed on a standardized once in every sixth day cycle. In addition, the annual PM_{10} standards was also violated for that year. However, in 1986 neither the 24-hour nor the annual PM_{10} standard were violated. Data from a TSP monitor located at CLNWC indicates several very high concentrations of TSP, which the districts believe would have probably caused violation of at least the 24-hour PM_{10} standard. Both the PM_{10} and TSP samples taken from Trona and CLNWC were collected in accordance with the standard "every sixth day" cycle.

The severity of the PM problem can increase to the level that visibility in the region is diminished. This has been a environmental concern of many, especially those who would wish to preserve good visibility for the military operations that occur in the region. An air quality study (the "RESOLVE" study) observed that two types of synoptic conditions can lead to degraded visibility in the desert from PM transport. One condition, results from mesoscale transport of pollutants from upwind basins to the desert and is shown in Figure 2-4(A) and 2-4(B). In summer, a thermal low-pressure condition seen in Figure 2-4(A), is frequently present, while the prefrontal condition in Figure 2-4(B), typically occurs in other seasons. On other occasions (see Figure 2-4(C)) the presence of a strong pressure gradient aligned with the north-south desert valleys can lead to degrading visibility.

FIGURE 2-4

SYNOPTIC CONDITIONS LEADING TO VISIBILITY DEGRADATION IN THE CALIFORNIA DESERTS



2.2 Contributors to the Searles Valley PM_{10} Problem

Environmental Elements

As described earlier, PM can arise from natural sources such as sea spray, mineral particles, soot, etc.. In the desert region, one would naturally think of dust storms as a natural contributor to the PM_{10} problem. This can be true under certain conditions. As Figure 2-3 illustrates, the Owens (Dry) Lake is widely known for its tremendous generation of PM_{10} emissions that can impact the air quality for miles. On certain occasions, dust storms at Owens (Dry) Lake have impacted the SVPA.

Except in cases of extremely high winds, the native desert soil found in the region would not ordinarily blow if left undisturbed. Rather, wind erosion generally occurs as a result of human activities on the land. The crust on the native soil is broken and the soil particles are free to blow. Further breakage of the particles can result as the particles are carried with the wind and are deposited.

An environmental element to the PM_{10} problem, though not considered a "natural" element, is the occurrence of intrabasin and interbasin pollutant transport. It is a subject that has generated widespread concern, especially with respect to the transport of ozone. The issue of the SVPA being impacted by PM emissions being generated in other air basins has been mentioned at the public scoping meeting held to discuss this plan. Although reliable data is not currently available to adequately quantify the potential impact resulting from pollutant transport, it is an occurrence which is qualitatively known to occur. It is recommended that the ARB and the USEPA recognize the importance of this element in the PM_{10} problem and provide appropriate policies to address this issue.

Industrial Activity

The principal industrial activity in the SVPA occurs at facilities in the Searles Valley. One of the largest industrial operations is conducted by the North American Chemical Corporation (NACC). Three major facilities are within a five mile radius and are located in the communities of Argus, Trona and Westend, California. NACC and its predecessors have been extracting minerals from the Searles Dry Lake bed since 1862. The extraction and manufacturing operations provide employment for approximately 1,200 persons of the Searles Valley's estimated 3,500 population. The Trona Railway, a 30 mile track from the nearest Pacific Railway line, is the major freight haul route into the Searles Valley. Coal and coke, in a 60/40 blend, to fire the industrial boilers at the plants arrives by train. NACC processes brine taken from Searles (Dry) Lake and produces a variety of chemicals principally as bulk products. These products are used in fertilizers, insecticides, plant defoliants, soil conditioners, in paper industry processes, glass, textile and ceramic industries, in storage batteries, in refrigerants, pharmaceutical and many others. The total annual production at the plants is approximately 1.65 million tons per year (DOC 1987, p 5)[8].

The operation of the NACC facilities is an integrated operation which also involves activities on the adjacent Searles Lake. Two coal fired boilers at the Argus facility which produce steam and electricity for all three facilities. Also, Pyco Ace Co-generation Plant, located adjacent to the NACC facility, produces steam and electricity. Part of the steam is supplied to NACC and the electricity is sold to Southern California Edison (SCE) Company.

There are other smaller industrial facilities within the SVPA which are typical of the rural areas of Eastern California. These include sand and gravel operations, concrete and asphalt batch plants, mineral mining operations, and salt production operations. One such facility is the Leslie Salt Company, which consists of a small intermittently operated salt evaporative pond facility just south of Searles Dry lake. The permitted equipment consists of two diesel powered Internal Combustion engines used primarily for brine pumping wells. This facility is too small to be included in the ARB's annual emissions inventory listing for companies emitting 10 tons per year of any criteria pollutant or their precursors.

2.3 PM_{10} Monitoring and Meteorological Sites

ARB, Mojave Desert AQMD and NACC have been operating PM_{10} monitors in the SVPA on a once-every-sixth-day schedule since 1988. NACC, formerly, Kerr-McGee, also operated PM_{10} monitors on an everyday schedule from October 1984 through 1987. There are five PM_{10} monitoring sites in the Trona subplanning area with as many as four operating at one time. A sixth station near Trona is the one located in the Pinnacles area of Searles Valley (see Figure 2-5).

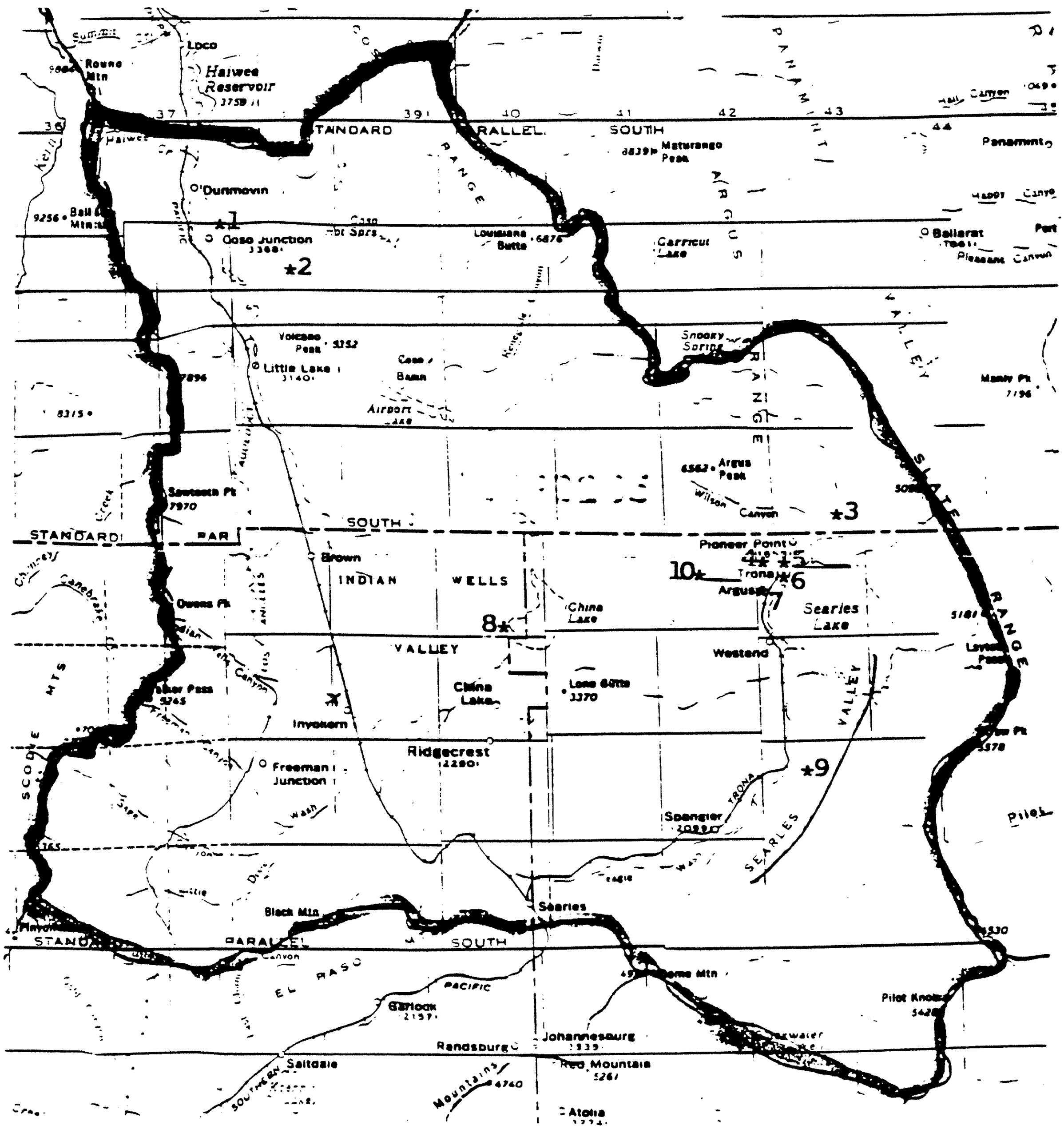
Each of the PM_{10} monitors is either co-located with a meteorological station or has a meteorological station nearby.

2.4 PM_{10} Exceedances

Exceedances of the 150 $\mu g/m^3$ 24-hour NAAQS for PM_{10} were recorded on 15 occasions since 1985 in the Trona area. A list of the observed days that PM_{10} standards were exceeded are shown in Table II-1 along with wind speed and direction data.

FIGURE 2-5

AIR MONITORING STATIONS



#1	Coso Junction Station	#6	Trona Station
#2	Coso, 10 Miles East, Station	#7	ACE-2 Station
#3	ACE-6 Station	#8	China Lake Station
#4	ACE-4 Station	#9	ACE-5 Station
#5	ACE-3 Station	#10	ACE-1 Station (inactive)

TABLE II-1

MET DATA FOR EVENTS OF $PM_{10} > 150$

Date	Site	PM_{10} ($\mu g/m^3$)	Wind: Average Speed (mph)	Wind: Avg. Dir	Wind: Peak Speed (mph)	Wind: Peak Dir
12/19/90	Ace-3	228	17	SW	26	S
04/23/90	Ace-3	178	17	VAR	36	W
04/23/90	Trona	366	14	SSW	32	WSW
02/21/88	Trona	150	2	SE	3	NE
10/28/86	Ace-2	183	2	NNW	5	NNW
04/02/86	Ace-1	153	7	NNE	26	NW
04/02/86	Ace-2	177	14	NNE	22	NNE
11/08/85	Ace-3	155	10	SW	26	SE
04/25/85	Ace-2	165	14	NNE	34	NNE
03/27/85	Ace-2	235	22	WSW	31	WSW
03/27/85	Ace-3	382	31	SW	36	SW
03/26/85	Ace-3	373	14	SW	26	SW
03/26/85	Trona	496	8	SSW	25	ENE
03/03/85	Ace-1	322	5	NE	14	NE
03/03/85	Ace-2	308	5	NE	12	NE
03/03/85	Ace-3	345	5	NNE	14	NE
03/02/85	Ace-2	179	12	WSW	22	W
03/02/85	Ace-3	167	14	SW	26	WSW
03/02/85	Trona	210				
02/21/85	Ace-2	174	12	NNE	24	NE
02/20/85	Ace-3	166	19	NNE	36	NNE
02/08/85	Trona	319	2	SSW	4	WNW
10/17/84	Ace-3	185	17	W	34	W

Exceedances of the PM_{10} standard in Trona occurred on days with high winds as well as calm days when wind erosion would not be expected to occur. The highest measured concentration of wind-born particulates, 496 $\mu g/m^3$, occurred on a day where winds peaked at 25 mph and the emissions could have been caused by wind erosion. In contrast, a concentration of 319 $\mu g/m^3$ was measured at the same site in Trona with peak winds of only 4 mph. This is indicative of sources other than wind blown dust causing the problem.

2.5 Expected Number of Exceedances

It must be noted that sampling for PM_{10} did not occur every day, but rather once every sixth day. Because of this, it is uncertain how many times or by how much the 24-hour PM_{10} Standard may have been exceeded at each site on days that were not sampled. It is apparent from the more frequent sampling performed at Trona prior to 1988, that multi-day air pollution episodes occur and that one-in-six day sampling misses some violations.

To account for days that were not sampled, the expected number of exceedances can be determined using the method described in 40 CFR Part 50, Appendix K., Section 3.1. To simplify the Appendix K methodology, the assumption is that each one-in-six day sample shall be counted as six days for all sites, except the daily sampling for the Trona-Ace sites prior to 1988. The expected number of exceedances for each site is shown below.

(# of Violations)	**x (Frequency)**	**=**	**# Exceedances**
Trona	4 x 6	=	24
Trona Ace-1	2 x 1	=	2
Trona Ace-2	6 x 1	=	6
Trona Ace-3	7 x 1 + 2 x 6	=	19

2.6 PM Trends and the Annual PM_{10} Standard

Quarterly average PM_{10} values are plotted for each of the sites in Figures 2-6 and 2-7. The trends show seasonal fluctuations, but no marked change in concentration trends

.

The SVPA has not demonstrated any exceedance of the 50 $\mu g/m^3$ annual average NAAQS for PM_{10}. The annual average is calculated by first averaging the quarterly average PM_{10} concentrations for each year and then averaging the averages for the last three years (1988-90). This is shown in Appendix A-4, which indicates that the annual average for Trona.

FIGURE 2-6

TRONA PM_{10} DATA
(Micrograms per cubic meter)

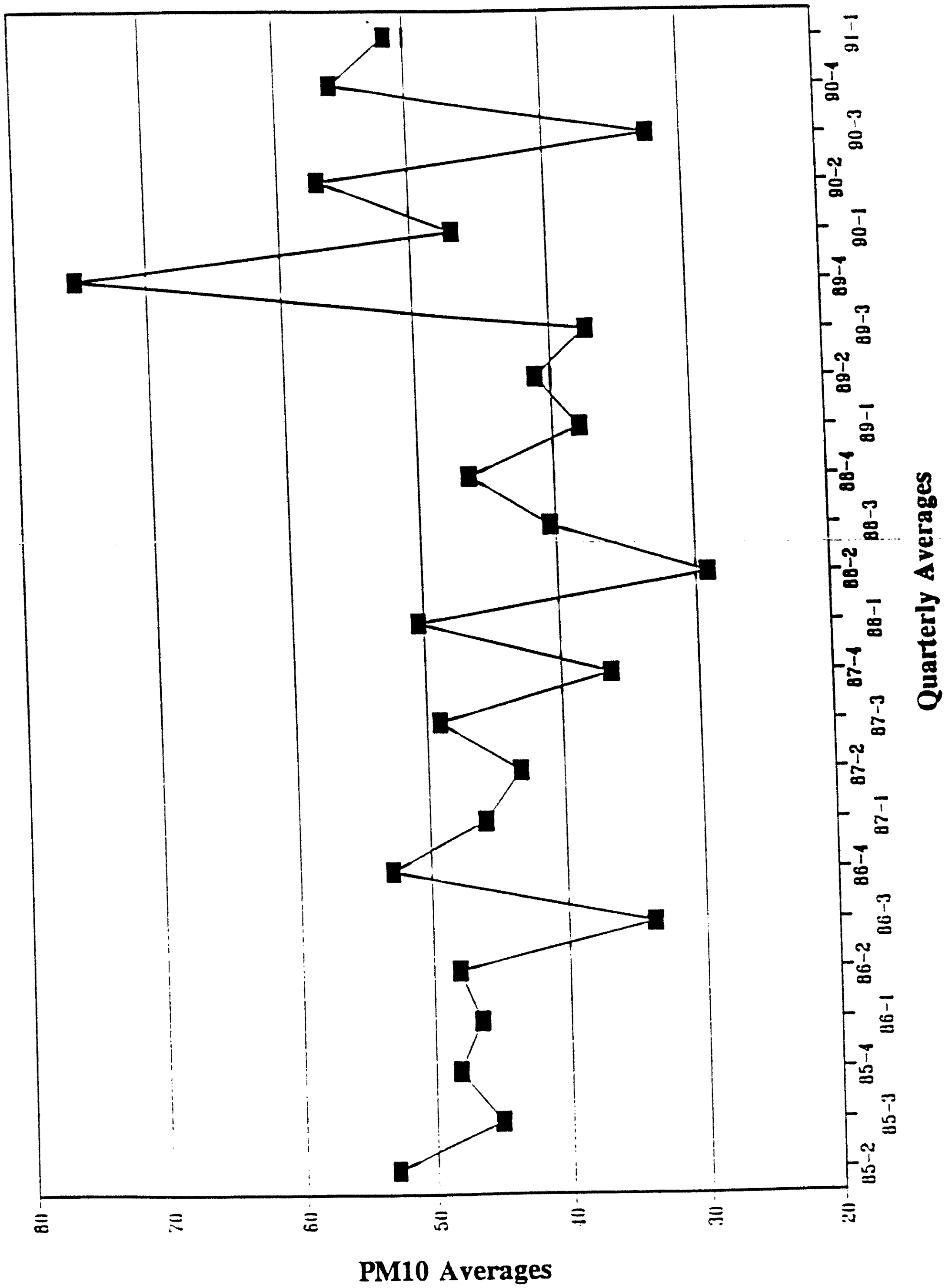
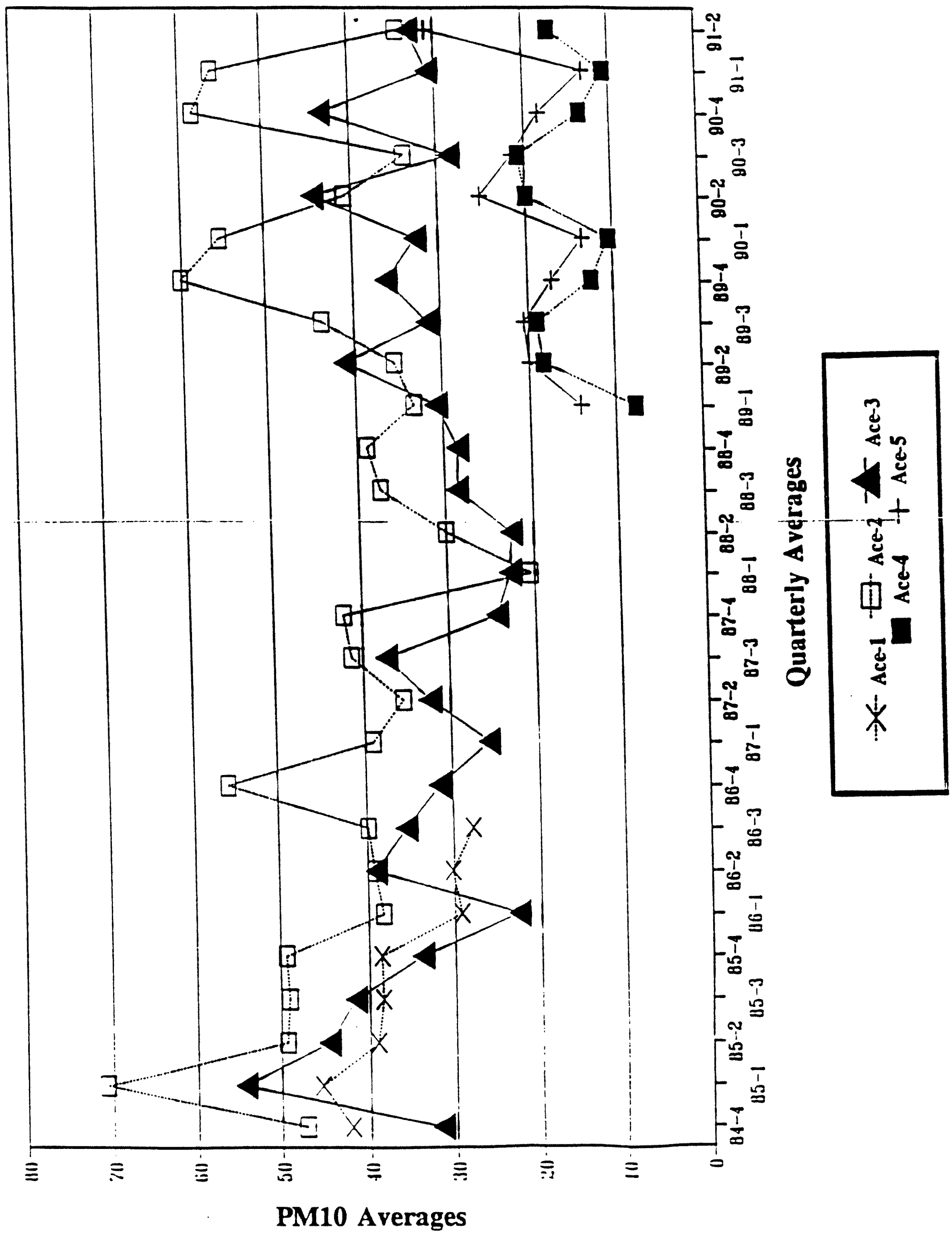


FIGURE 2-7

TRONA ACE SITES PM_{10} DATA
(Micrograms per cubic meter)



CHAPTER III

EMISSIONS INVENTORY

3.1 Emissions Inventory

For inventory purposes, 1987 was used as the base year because it represents the most complete and final document from ARB. The inventory is used to predict the future year emissions, and further used for linear roll-back calculations. To arrive at an emissions inventory for Searles Valley, many assumptions were made. These assumptions include:

Emission Factors and Criteria

The emissions inventory prepared for the Searles Valley PM_{10} Plan was used as the foundation for the updating the SVPA 1987 through 1994 PM_{10} emissions inventory. This inventory was then adjusted to include more recent information judged by the District to be accurate and reflective of the actual emissions being generated within the SVPA. Table III-1 displays the updated and projected inventory.

Two general factors were used to determine the fraction of District-wide emissions that were allocated to the SVPA. The first is a geographic area factor equal to the ratio of the District portion of the SVPA area (575 miles^2) over the area of the District as a whole (18,980 miles^2), which is 0.0303 or 3.03 percent. The second is a population distribution factor equal to the ratio of the District portion of the SVPA population (3,431 persons, according to the 1990 census) over the District population as a whole (315,633 persons, according to the 1990 census), which is 0.0109 or 1.09 per cent. The following conservative assumptions were made in the preparation of the SVPA (District portion) PM_{10} emission inventory on a category-by-category basis.

Construction/Demolition

"Construction/Demolition" includes a portion of the District-wide emissions from residential construction dust, commercial construction dust, industrial construction dust, and road construction dust. The measure of these District-wide emissions categories that occurs within the District portion of the SVPA was determined using both the geographic area factor and the population distribution factor under the assumptions that residential and commercial construction activity are relative to local population, and industrial and road construction activity are relative to the amount of area under consideration. Base District-wide emissions are taken from the District area source emission inventory, calculated using "Methods for Assessing Area Source Emissions in California" (ARB 1991). In brief, the methodology for determining these emissions involves establishing the total amount (by dollar value of miles of road added or building permits granted) of the corresponding facilities constructed during the calendar year in question and multiplying by average disturbed area per unit facility constructed, construction time, and emissions per unit construction time factors. This category was projected to change proportionally to District-wide construction using 1990 as the base year.

Public Unpaved Road Dust

"Public Unpaved Road Dust" includes a portion of the District-wide emissions from city & county unpaved road travel dust and BLM unpaved road travel dust. The measure of the District-wide emissions that occurs within the District portion of the SVPA was determined using the geographic area factor, under the conservative assumption that unpaved road activity is proportional to geographic area. The Base District-wide emissions were determined using standard ARB methodology (ARB 1991). Briefly, mileage of unpaved roads in each category within the District (obtained from Caltrans) were multiplied by average daily activity and emissions per vehicle mile travelled factors. The District portion of the SVPA is estimated to contain 17 miles of BLM roads and 27 miles of city and county roads. Public unpaved road emissions were not projected to change.

Paved Road Dust

"Paved Road Dust" includes a portion of the District-wide area source emissions inventory. The measure of these District-wide emissions that occurs within the District portion of the SVPA was determined using the population distribution factor, under the assumption that paved road travel is proportional to the population in the region. Base District-wide emissions were calculated using standard ARB methodology (ARB 1991). In brief, total on-road vehicle miles travelled within the District were obtained from Caltrans and multiplied by emission and travel fraction factors for freeways, major streets, and collector/local streets. This category was projected to change proportionally to District-wide vehicular activity, as predicted by Caltrans.

Mobile Sources

"On Road Vehicle Exhaust" includes a portion of the District-wide emissions for on-road vehicles, incorporating light, medium, and heavy-duty vehicles and motorcycles. Caltrans and ARB generate future year emissions data using EMFAC and BURDEN, as described in "Methodology for Estimating Emissions from On-Road Motor Vehicles, Volumes I-III" (ARB 1993). The District used on-road vehicle exhaust information for 1987, 1991 and 1994 and linearly interpolated intervening years. The measure of these emissions that occurs within the District portion of the SVPA was determined using the population distribution factor.

"North American" includes the emissions identified by "North American Chemical Company 1990 Emission Inventory for Criteria Pollutants" and subsequent years (NACC 6/1991, NACC 6/1992, and NACC 8/1993), as mobile sources. This category includes light and heavy mobile equipment, vehicles, and switching locomotives. This category was projected to change proportionally to District-wide mineral manufacturing using 1992 as the base year.

"Locomotives Road Hauling" includes a portion of the District-wide emissions for line haul railroad emissions to account for Southern Pacific shipping. The measure of these emissions that occurs within the District portion of the SVPA was conservatively determined using the geographic area factor. This category was projected to change proportionally to District-wide rail activity using 1990 as the base year.

Unplanned Fires

"Unplanned Fires" includes a portion of the District-wide emissions from timber and brush wildfires. The measure of these emissions that occurs within the District portion of the SVPA was determined using the geographic area factor. This category was projected to change proportionally to District-wide wildfire activity using 1990 as the base year.

Public Disturbed Areas

"Public Disturbed Areas" includes emissions estimated by Sierra Research (as part of an October 1991 letter from R.W. Andersen to Kayode Kadara regarding the PM_{10} Attainment Plan (NACC 10/1991)) as wind erosion from disturbed areas within the Trona area. In the Trona area 210 of 1247 acres are estimated to be disturbed on a daily basis, producing 32.6 pounds per acre per day of fugitive dust emissions. This category is not projected to change significantly through 1994.

Fuel Combustion

"Fuel Combustion" describes the emissions from a cogeneration boiler facility closely associated with the chemical manufacturing located within the SVPA. This facility commenced operations in 1990, with full operation in 1991. The District point source emission inventory for 1991 was used to determine 1991 emissions for this source. Emissions for 1990 were estimated using District permit information. This facility was not projected to increase in emissions after 1991.

North American Stacks

"North American Stacks" includes the stack and process emissions as described by the North American Chemical criteria emissions inventories submitted to the District on an annual basis (NACC 6/1991, NACC 6/1992 and NACC 8/1993). The criteria inventory submissions for 1987 through 1992 were reviewed for consistency and summarized. Post 1992 emissions for this category were estimated to change proportionally to District-wide mineral manufacturing activity using 1992 as the base year.

North American Fugitive

"North American Fugitive" includes the fugitive emissions (except for unpaved road emissions) as described by the North American Chemical criteria emissions inventories submitted to the District on an annual basis (NACC 6/1991, NACC 6/1992, and NACC 8/1993). The criteria inventory submissions for 1987 through 1992 were reviewed for consistency. Post 1992 emissions for this category were estimated to change proportionally with District-wide mineral manufacturing activity using 1992 as the base year.

Industrial Roads

"Industrial Roads" includes the road dust emissions described by the North American Chemical criteria emissions inventories submitted to the District on an annual basis (NACC 6/1991, NACC 6/1992, and NACC 8/1993), with an adjusted road emission calculation, reflecting North American, North American Contractor, and Pacific Salt industrial road activity. Sampling was performed on July 28, 1993 to establish road surface silt loadings for roads within NACC's four operating areas suitable for use with USEPA's industrial paved road equation as described in "Compilation of Air Pollutant Emission Factors" (USEPA 1985). Vehicle activity levels in criteria inventory submissions for 1987 through 1992 were reviewed for consistency, and 1990 activity levels were used as a conservative baseline for future year activity. Post 1990 emissions for this category were estimated to change proportionally with District-wide mineral manufacturing activity using 1990 as the base year.

TABLE III-1

SEARLES VALLEY PLANNING AREA (TRONA PORTION) PM_{10} EMISSION INVENTORY (all emissions in tons per day)

Description	1987	1988	1989	1990	1991	1992	1993	1994
Construction/Demolition								
Residential Construction Dust	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Commercial Construction Dust	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Industrial Construction Dust	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Road Construction Dust	0.47	0.49	0.50	0.51	0.52	0.53	0.55	0.56
Public Unpaved Road Dust								
City & County Unpaved Road Dust	0.46	0.46	0.46	0.46	0.46	0.46	0.46	0.46
BLM Unpaved Road Travel Dust	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29
Paved Road Dust								
Paved Road Travel Dust	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Mobile Sources								
On-Road Vehicle Exhaust	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Locomotive Rail Hauling	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
North American Vehicle Exhaust	0.03	0.03	0.04	0.02	0.02	0.02	0.02	0.02
Unplanned Fires								
Timber & Brush Wildfires	0.01	0.06	0.01	0.01	0.01	0.01	0.01	0.01
Public Disturbed Areas								
Public Area Wind Erosion	3.42	3.42	3.42	3.42	3.42	3.42	3.42	3.42
Fuel Combustion								
Argus Cogeneration	0.00	0.00	0.00	0.06	0.07	0.07	0.07	0.07
North American Stacks								
North American Point Sources	3.33	2.65	2.17	2.12	1.79	1.11	1.09	1.08
North American Fugitives								
North American Fugitives	0.13	0.12	0.13	0.11	0.11	0.11	0.11	0.11
North American Wind Erosion	0.30	0.31	0.34	0.34	0.34	0.46	0.45	0.45
Industrial Roads								
Industrial Roads	4.65	4.56	4.52	4.43	4.34	4.30	4.21	4.16
Regional Total PM_{10} Emissions	**13.43**	**12.73**	**12.22**	**12.11**	**11.71**	**11.12**	**11.02**	**10.97**

Note: Italicized category headings correspond to inventory headings as used in Table V-1.

3.2 PM_{10} Design Concentration

The PM_{10} control strategy is dependent upon a selected design value representing a PM_{10} concentration. Thus, an appropriate episodic emissions inventory for a specific day is needed. The episodic emission inventory should reflect the possible sources that could have contributed to the measured ambient PM_{10} concentrations in the local area on the selected design day.

The level of concentrations measured reflects what the surrounding communities are exposed to on a particular day. The linear roll-back model, which is explained later, is used to estimate the contribution from each of the emission sources to the ambient PM_{10} concentration on the design day. However, prior to performing linear roll-back analysis, a design day ambient PM_{10} concentration and emission inventory should be developed.

Because of the large spatial separation of sources in the SVPA, it is inappropriate to base the design day and design concentration on an area-wide emission inventory and a single monitoring site. It is unlikely that all sources contributed to the ambient concentrations at any one site. For planning purposes, the SVPA is separated into three subplanning areas: Trona, China Lake and Coso Junction. For the purpose of this text, discussion of PM_{10} concentrations include the Trona Subplanning area only.

For the Trona Subplanning Area, the PM_{10} Plan contained two design concentrations that were initially determined to be necessary, one for windy days and another for non-windy days. However, information obtained since the PM_{10} Plan was released, resulted in discarding the two previously selected design-days for the Trona Subplanning Area. The justification for dropping these days is discussed below.

Design concentrations are selected based on the "Table Look-Up Method" in the PM_{10} SIP Development Guidelines (1987). The highest measured value is used for sites with less than 348 days of data.

LOCATION	CONCENTRATION	DATES	CONDITION
Trona	228 $\mu g/m^3$	December 19, 1990	Windy

Since the development of the PM_{10} Plan, further analysis of the previously identified design-days was performed. Staff decided that the design values to be used in the final analysis should be selected from the last three years of monitoring data recorded. Thus, the previously selected design day of February 8, 1985 has been eliminated from consideration. During the public review period, additional information and data was obtained relative to the April 23, 1990 design-day for the Trona Subplanning Area. Based on the new information and supporting data, staff decided that the April 23, 1990 day is not a satisfactory day for further consideration as a design-day (Please see Appendix F-2). This results in the selection of a new design-day for the Trona Subplanning Area. Staff then looked at which day in the Trona area recorded the next highest PM_{10} value within the last three years. This day is December 19, 1990. Thus, a new linear roll-back analysis is performed in Chapter 5.

3.3 Design Day Source Contributions

For Trona, the control strategy is determined using the December 19, 1990, which is considered a moderately windy day. It is a day that is dominated by wind blown dust with routine emissions from all other sources.

Comparison of Base Year Inventories

The SVPA (District portion) PM_{10} emission inventory was generated by disaggregating and calculating emissions from source categories existing in the area. The resulting SVPA emission inventory differs from the District-wide PM_{10} emission inventory in several areas. There are also some differences when it is compared to ARB's latest projected PM_{10} emission inventory for the District. In order to establish the differences, ARB requested a discussion of those deviations with explanations. Table III-2 contains a sub-category by sub-category presentation of each inventory, illuminating those differences (as noted by the italicized comments).

TABLE III-2

TRONA SUBPLANNING AREA PM_{10} INVENTORY COMPARISON
(all emissions in tons per day)

	District-Wide		SVPA (Trona portion)
Category	1987	1989	1987
Fuel Combustion Agricultural *The SVPA does not contain any agricultural operations.*	---	0.04	---
Other Manufacturing/Industrial *The SVPA does not contain any Other Manufacturing/Industrial operations.*	0.3	0.15	---
Electric Utilities *A cogeneration power plant was constructed within the SVPA in 1989 and represents the only emission-generating electric utility operations in the area.*	0.1	0.52	0.06*
Other Services and Commerce *The emissions from this category within the SVPA are negligible.*	0.1	0.48	---
Residential/Other *The emissions from this category within the SVPA are negligible.*	---	0.29	---
Waste Burning Incineration *The SVPA does not contain any incinerators.*	---	---	---
Solvent Use Asphalt Paving *The emissions from this category within the SVPA are negligible.*	---	0.05	---
Petroleum Process, Storage and Transfer Petroleum Refining *The SVPA does not contain any petroleum refineries.*	---	0.03	---
Industrial Processes Chemical *The SVPA does not contain any chemical industrial operations.*	---	2.54	---

	District-Wide		SVPA (Trona portion)
Category	1987	1989	1987
Food and Agricultural *The SVPA does not contain any food and agricultural industrial operations.*	0.1	0.36	---
Mineral Processes *A major mineral mining/processing facility exists within the SVPA; this category includes its process and process fugitive emissions.*	13	2.49	3.76
Miscellaneous Processes Farming Operations *The SVPA does not contain any agricultural operations.*	0.5	1.06	---
Construction and Demolition *A fraction of the District-wide emissions occur within the SVPA.*	22	22.57	0.56
Entrained Road Dust - Paved *A fraction of the District-wide emissions occur within the SVPA.*	13	15.18	0.17
Entrained Road Dust - Unpaved *A fraction of the District-wide emissions occur within the SVPA.*	25	24.77	5.40
Unplanned Fires *A fraction of the District-wide emissions occur within the SVPA.*	0.7	0.02	0.01
Natural Sources *This category describes emissions from disturbed area wind erosion within the SVPA.*	18	17.54	3.42
Mobile Sources On Road Vehicles *A fraction of the District-wide emissions occur within the SVPA.*	5.2	---	0.06
Trains *A fraction of the District-wide emissions occur within the SVPA.*	1.7	1.64	0.02
Mobile Equipment *A fraction of the District-wide emissions occur within the SVPA.*	0.1	0.39	0.03

	District-Wide		SVPA (Trona portion)
Category	1987	1989	1987
Utility Equipment *The emissions from this category within the SVPA are negligible.*	---	0.01	---

Note: (---) indicates negligible emissions within the category.
* Indicates emissions that are generated after 1987.

CHAPTER IV

CONTROL STRATEGY SELECTION AND IMPLEMENTATION

4.0 Introduction

Sources of PM emissions must be controlled in order to achieve reductions in the existing concentrations of PM_{10} in the SVPA. As illustrated in earlier chapters, PM emissions arise from point sources and various fugitive sources, such as processes or open areas at both industrial and nonindustrial sites. Staff formulated appropriate control strategies by examining the sources and the conditions in which the PM_{10} problem presented itself. Development of a feasible control strategy, required only examining those sources which were capable of being controlled. Therefore, natural sources of PM_{10} were excluded. Primary focus was placed on the largest sources of emissions, as having the greatest potential for reductions. A preference was placed on preventative rather than mitigative emission control measures.

This chapter will detail many of the control measures which the USEPA has determined are reasonably available methods for reducing PM_{10} emissions. An assessment was made as to whether the available USEPA/ARB measures were suitable and necessary for implementation in the SVPA. Staff conclusions on applicable controls for specific source categories will be detailed in the subsequent discussion under the appropriate source heading. Certain control measures were selected to form the foundation of a strategy to control PM_{10} emissions generated locally. In addition, a time frame for implementation of each control measure has been included as an important element of the plan.

4.1 Identification & Selection of Control Strategy

The USEPA guidance document entitled "PM_{10} Moderate Area SIP Guidance: Final Staff Work Product" was relied upon in determining and selecting control strategies for the SVPA PM_{10} Plan. This guidance paper included control measures recommended for Moderate PM_{10} nonattainment areas. These suggested measures have been included as a federally mandated component to this PM_{10} Plan. They will form the basis of a primary strategy to address the PM_{10} problem. In addition, an earlier USEPA document "Control of Open Fugitive Dust Sources. was also used for identification of various control measures which were applicable to the SVPA. Any measure not identified in the "Moderate Area SIP Guidance" will be considered an alternate control measure, though not necessarily secondary in importance. The USEPA technical documents were also used to provide supporting documentation for many of the measures selected for incorporation into this plan. This included such information as estimated control efficiencies and, where available, cost-effectiveness.

Reasonably Available Control Measures

A SIP for an area classified "Moderate" must contain "reasonably available control measures" (RACM) for the control of PM_{10} emissions. The guidance document[11] cited earlier suggests that specifying RACM can be done by listing all the available control measures including controls for fugitive dust, residential wood combustion, and prescribed burning. In addition, other RACM have been detailed in another prior USEPA document entitled "Control of Open Fugitive Dust Sources". After a list is compiled, then a determination is made as to which measures may be unreasonable because of their effect on the sources is insignificant. If any measures are unreasonable for this reason, they may be excluded from further consideration. However, if any measures are identified by the state or from public comment to be "available" for a particular circumstance, the USEPA guidance states they are to be included in the list being compiled for the area. Once the list of all available measures is complete, an evaluation is performed to determine each measure's reasonableness, considering technological and economic feasibility in the SVPA. It is assumed that all measures identified by the USEPA in the cited guidance document dated April 1991, are "available" and assumed to meet the technological and economic feasibility criteria.

A State may refute the "availability" of RACM by demonstrating that a measure is technological or economically infeasible, or otherwise unreasonable for a particular area, or on a case-by-case basis. Staff must provide justification in the event of a full or partial rejection of a measure. In addition, the USEPA guidance mandates that the control measure evaluation should consider the impact of reasonableness of the measure on the municipal or other governmental entity that must bear the responsibility for implementation of control measures on public sector sources.

Table IV-1 includes a listing for the control methods which have been determined by the USEPA as "available" control measures to reduce fugitive PM_{10} emissions. Each measure has been assigned a number for ease reference. The USEPA recommended measures presented here will fulfill a primary role of achieving emission reductions. In addition, some of the measures included in the control strategy represent methods which have been employed in other air districts.

Table IV-2 itemizes fugitive dust control methods suggested by the ARB and classified according to type of sources to be controlled. Since the USEPA lists a broad strategy of fugitive PM_{10} control methods, the list established in Table IV-2 will serve as the 'master list' of control measures to be evaluated for this plan.

TABLE IV-1

USEPA SUGGESTED FUGITIVE DUST CONTROL MEASURES

Control No.	Control Methods/Work Practices
CM-1	Pave, vegetate, or chemically stabilize access points where unpaved traffic surfaces adjoin paved roads.
CM-2	Require dust control plans for construction or land clearing projects.
CM-3	Require haul trucks to be covered.
CM-4	Provide rerouting or rapid clean-up of temporary sources of dust on unpaved roads.
CM-5	Prohibit permanent unpaved haul roads, and parking or staging areas.
CM-6	Develop traffic reduction plans for unpaved roads.
CM-7	Limit use of recreational vehicles on open land.
CM-8	Improve material specification for and reduction of usage of skid control sand or salt.
CM-9	Curb and pave or stabilize shoulders of paved roads.
CM-10	Pave or chemically stabilize unpaved roads.
CM-11	Pave, vegetate, or chemically stabilize unpaved parking areas.
CM-12	Implement control measures for material storage piles.
CM-13	Provide for storm water drainage to prevent water erosion onto paved roads.
CM-14	Revegetation, chemical stabilization, or other abatement of wind erodible soil.
CM-15	Implement soil conservation requirements of the Food Security Act to reduce emissions from agricultural operations.

TABLE IV-2

ARB SUGGESTED FUGITIVE DUST CONTROL MEASURES

Source Category	Control Method/Work Practice
Paved Road Travel	Vacuum Sweeping of Road Water Flushing of Excess Soil on Road
Unpaved Road Travel	Surface Improvement of Road Traffic Controls on Vehicular Traffic Wet Suppression of Road Chemical Stabilization
Construction/Demolition	Cleaning and Covering of Trucks Wind Breaks Wet Suppression Chemical Suppression
Agricultural Operations	Plug & Punch Planters Aerial Seeding Laser-Directed Land Planting Alternating Crop Varieties Electrostatic Fogger
Cattle Feedlots	Watering of Feedlots Manure Scraping
Materials Handling/Storage Piles	Wind Screens Enclosures Around Storage Piles Water Spray Application to Storage Piles Chemical Treatment of Storage Piles
Mineral Processing	Baghouses Enclosures to capture process fugitives Wet Suppression
Wind Entrainment	Fences/Barriers to Enclose Disturbed Area Growing Vegetation over Disturbed Soil Irrigation/Sprinkling of Disturbed Soil Covering with Gravel Surface Compaction Chemical Stabilization

In addition, there are two other PM_{10} control strategies which were declared "available" by the USEPA, Residential Wood Combustion and Prescribed Burning. Table IV-3 summarizes the specific control measures which could be employed to control emissions from this source category. Additional documentation on these measures can be found in the USEPA guidance document.

TABLE IV-3

USEPA RESIDENTIAL WOOD COMBUSTION AND PRESCRIBED BURNING CONTROL MEASURES

Control No.	Control Methods/Work Practices
CM-16	Residential Wood Combustion Program includes: - Curtailment program during episodes - Public education methods to reduce wood smoke - Wood dryness certification program - Inducements to accelerate changeover to more acceptable devices
CM-17	Prescribed Burning Program - Designation of "Burn Days" - Formalized "Burn Request" Procedures - Voluntary Training in Smoke Management Techniques - Public Education to Raise Awareness of Smoke Mgmt. - Surveillance and Enforcement - Develop Emission Inventories for burns - Develop Emission Reduction Efforts

In comparison, the ARB has offered only a few suggested control measures for residential wood combustion in the guidance document reference above. These include (1) the use of Catalytic and Non-Catalytic Heaters, (2) Pellet Wood Stoves, and (3) Limit Wood Moisture Content. For the other source category (prescribed burning) the ARB does not list any recommended control measures. Based on the emission inventory, residential wood combustion and prescribed burning are insignificant sources in the SVPA. At this time, they are not considered important sources for control. Since the SIP is required to consider all possible controls, residential wood combustion and prescribed burning are discussed in Appendix C for completeness purposes.

Pursuant to the District's intent to receive public input in this process, a scoping meeting was held on August 15, 1991 to solicit information on what kinds of control methods should be incorporated into this plan. No suggestions were offered by the general public nor the public agencies that attended the scoping meeting (see Appendix E-2 for list of attendees). No written comments were received on this matter either. Therefore, assessments of the above control measures and their applicability to the SVPA were made. The selected list of control measures that will be subject to implementation in the SVPA will be found in Section 4.7.

Reasonably Available Control Technology

Section 172(c)(1) of the 1990 FCAA provides that RACM for nonattainment areas shall include "such reductions in emissions from existing sources in the area, as may be obtained through the adoption, at a minimum, of reasonably available control technology (RACT)[13]". The USEPA guidance document states that RACT applies to the existing sources of PM_{10} stack, process fugitive, and fugitive dust emissions. USEPA suggests major stationary sources should, at a minimum, be an agency's "starting point" of RACT analysis. However, the USEPA "generally construes RACT to apply to all existing sources in the area that are reasonable to control in light of the attainment needs of the area and the feasibility of such controls"[14].

The guidance document reaffirms that RACT for a particular source has always been determined on a case-by-case basis. Thus, the proposed control measures include broad strategies that must be individually tailored to a facility depending on the sources' processes, operating procedures, raw materials, plant layout, and any other environmental conditions that are relevant. These factors can significantly influence whether implementing changes will be feasible. Such issues will be addressed after the plan adoption and during the rule making process. The number and kind of control measures, to be included in the plan, have been selected to provide enough technological variety so the major stationary sources will be able to make the necessary effort to reduce PM_{10} emissions at their facilities.

With respect to economic feasibility, the analysis involves the cost of reducing emissions and the difference in costs between a particular source and other similar sources that have implemented emission reductions. The USEPA presumes that it is reasonable for similar sources to bear similar costs of emission reduction. To determine economic feasibility, the capital costs, annualized costs and cost effectiveness of an emission reduction technology are considered. Staff relied on cost information provided by the USEPA and other air districts to assess the monetary considerations for the control measures selected for eventual implementation. However, the decision to select certain measures was not based on costs, but on efficiency of the suggested control measures to achieve emission reductions. In some cases, data was either lacking or insufficient. During the rule making phase, a more complete analysis of costs and control efficiency will be detailed.

Reduction Potential of the Control Measures

Estimating the amount of emission reductions that may be achieved with each control measure is an important element of the PM_{10} Plan development. In the sections which follow, each source category to be controlled has been discussed and will include specified control methods or a combination of techniques. Also, estimates of the emission reductions that may be achieved with implementation of specific control measures are included. The emission reduction analysis provided was based on data and values reported by the USEPA and other air districts.

Framework for Control Measure Implementation

Success of the SVPA PM_{10} Plan depends on the timely implementation of an effective control strategy. This plan denominates the area of responsibility which the affected air districts will share with the local governing bodies as they oversee the implementation phase of the control strategy. Most of the measures may either be made effective by adoption of air districts rules/regulations, or may be operative through a city/county ordinance. Several of the identified strategies simply rely on enhancement of activities currently being performed by the local air districts.

In general, implementation of many of the control measures will require the assignment of sole responsibility for enforcement, to one of several public agencies (eg. city, county, BLM, etc...) that has jurisdiction over public land/activities in the SVPA. In addition, different implementation processes will define whether a control method will apply to public versus private land. A summary of the plan's implementation framework is presented at the end of this chapter. Many details of control measure implementation, by necessity, will be devised during the rule development stage which follows the adoption of this plan.

In summary, federal requirements, pertinent ARB provisions and the local environmental conditions, to create a management plan to control significant sources contributing to the PM_{10} problem were adequately considered. This plan consists of a primary control approach which includes all necessary RACM. In addition, alternate control measures were identified and will be implemented as needed. Each air district will select the combination of control measures and programs that will achieve a sufficient reduction in PM_{10} emissions relative to their design day requirements.

4.2 Control of Industrial & Military Sources

Controlling Emission From Military/Industrial Sites

Background & Regulatory History

Historically, stationary sources such as industry and manufacturing plants have been subject to air pollution control regulations promulgated by the federal, state and local agencies. As detailed in Chapter II, a number of industrial facilities in the SVPA are currently operating under air district permit conditions, but may need to comply with new requirements outlined by the PM_{10} Plan. Military base operations have only recently been required to fully comply with all regulations, especially local requirements from the air districts. Consequently, exemptions were routinely allowed for certain military practices, such as research and development for defense activities. Yet, a significant portion of PM_{10} emissions arising from stationary sources may be attributable to operations associated with the military. It is imperative to include the military activities in these categories and focus on an immediate control strategy to be implemented at all stationary sources. In the discussion that follows, wherever "industrial" is used, also refers to military facilities.

Earlier discussion indicates that pollutant emissions from industry contributes a significant share to the PM_{10} emissions generated in the SVPA. The portion of emissions attributed to military operations remains unclear, because of the status of the emission inventory to date and the lack of permits on file for many of their operations. However, general knowledge of certain routine military operations and experimental practices necessitates an approach that would elicit inventory data and place certain existing activities under permit with the MDAQMD. Overall, increased control would result from increased enforcement requiring additional operations to be placed under permit, and imposition of new operational practices which would reduce the different categories of PM emissions at these facilities.

Emission inventory information for the major facilities in the SVPA was reviewed and classified into different source categories (eg. point, process fugitive, windblown dust, unpaved roads and paved road emissions). This approach allows conclusions to be drawn as to the relative total PM_{10} emissions contribution the different facilities emit to the atmosphere.

For those facilities whose emission data is incomplete or lack the necessary permits, this plan will outline administrative and enforcement policies to address any existing deficiencies. The combination of these approaches will provide adequate flexibility for the MDAQMD to tailor their programs and develop regulations from control measures that are specifically applicable to the sources within their respective jurisdictional boundaries.

<u>Description of Control Measures for Industry/Military Sites</u>

Point Sources: Primary Control Measures

1. New Source Review (NSR) Permit Program:

This provision is mandated by the 1990 FCAA pursuant to Section 189(a)(1)(A) and is due June 30, 1992. It requires that SIP's for Moderate areas must include an New Source Review (NSR) program governing the construction and operation of new and modified major stationary sources emitting PM_{10} (including in some cases, PM_{10} precursors, and meeting the requirements of section 173 of the revised law).

2. Control Requirements for Existing and New Facilities:

As discussed earlier, the USEPA requires at a minimum the implementation of "RACT". There is also "Best Available Control Technology (BACT) for stationary sources. This would be the utilization of the "best control apparatus or technique including operational methods for reducing a specific pollutant from a source. BACT for PM_{10} control at stationary sources is available and is currently being utilized by several sources in the SVPA. In some instances, RACT can be BACT when certain types of PM_{10} control methods are considered. However, BACT application will be done on a case-by-case basis for those sources in the SVPA. There are several different types of RACT/BACT pollution control equipment which can capture PM during industrial operations, and can be grouped as follows:

Fabric Filter Systems (Baghouses): A widely used air pollution control device consisting of a one or more fabric units (cloth bag) which filter particle laden gas during an industrial process. As the gas is filtered, the fine particles are trapped on the material and later removed during a cleaning cycle. Baghouses can greatly vary in size and specifics and may be custom made to the operation to be controlled. This type of control technology can be utilized in the SVPA for such equipment as industrial boilers, utility boilers, cement manufacturing (kiln, clinker cooler), Gypsum processing, lime processing and boric acid dryers[15].

Electrostatic Precipitators (ESP's): These devices capture PM by employing electrical forces to remove particles from a moving waste gas stream onto collecting plates. There are different type of ESP removal techniques, but generally they operate by charging the particles by passing them through gaseous ions which have been charged by high voltage electrodes between collection plates. During the process, particles accumulate on the plates for later removal. This technology can be employed on such operations as industrial and coal-fired utility boilers, rotary kilns, lime kilns, and portland cement manufacturing[16].

High Efficiency and Simple Cyclones: This is a device in which flue gases are mixed in a vortex causing particles to spin to the outer wall by centrifugal force. Once separated from the flue gases, the particles drop by gravity to be collected. Generally, these devices are used for a precleaning cycle before the use of more efficient collectors. The control method can be applied to such equipment as coal fired industrial and utility boilers, cement manufacturing, rotary ore dryers, rotary kilns, coal dryers, and clinker coolers[17].

Wet Scrubbers: There is a multitude of different variations of the wet scrubber type of PM control devices. Generally, the control process consists of a device which impacts, intercepts, or diffuses the target particles onto a surface or into liquid droplets for capture and later removal. This control equipment can be utilized on such operations as borax fusing furnaces, lime manufacturing, drying operations, coal-fired utility boilers, ore crushing and loading, rotary kilns, and aggregate plants[18].

Point Sources: Alternate Control Measures

1. Enhanced Enforcement Program:

The District would modify these current enforcement programs to ensure more complete inspection over stationary sources in the SVPA. Although this strategy does not represent a "primary" means to control stationary sources, it offers an alternate means to achieve significant control over sources in the SVPA. The following actions would substantially increase the efficiency and effectiveness of current enforcement activities.

More Inspectors with Specialized Training: The District would increase the number of inspectors or the number of man-hours devoted to inspection of sources located in the SVPA. The District may enter into cooperative reciprocal agreements for joint investigation and reporting procedures. As needed, District inspectors would be provided with specialized training designed to increase critical observation skills and investigatory techniques needed for common violations specific to sources in the SVPA.

More Frequent Routine and Random Inspections: Generally, most permit holders only receive a routine annual inspection. This measure would increase the number of inspections routinely performed by compliance personnel. This would promote more frequent maintenance and repair of machinery in order to ensure adequate performance during the more frequent inspections. In addition, it would encourage adherence to the permitted operating standards imposed on the stationary sources. There may be a corresponding increase in enforcement actions giving rise to eventual acts of compliance. Special attention would be directed at operational practices and processes which affect PM_{10} emissions at stationary source facilities.

More Frequent Emission Tests: Typically, for most sources compliance tests are conducted upon start-up and for some sources annually thereafter. This mechanism would require a schedule of increased frequency of testing to ensure compliance of the emission unit operations.

Mandatory Compliance and Penalties: Facilities found not in compliance with District regulations or permit requirements will be mandated to take immediate corrective action and/or face mandatory administrative penalties and fines.

Mandatory Continuous Emission Monitoring: Require large stationary sources, that have the potential to emit over 25 tpd of any pollutant, to install continuous emission monitoring devices on their emission stacks.

2. Enhanced Review for Future Variance Requests:

All applications for variances for facilities in the SVPA will be forwarded for review and comment by the neighboring air districts in the SVPA. Every variance request must include a calculation of potential PM_{10} emissions that may result if the variance is granted. If the variance is granted, District staff will conduct routine inspections and monitor data to ensure that facilities comply appropriately. Additionally, facilities will be required to maintain appropriate operational records and perform self-monitoring, inspection, and reporting program as may be required.

Process Fugitives: Primary Control Measures

Control No.	Control Methods/Work Practices
CM-12	Require Dust control measures for storage piles;
	Material Handling Practices must minimize fugitive dust emissions, by reducing mass transferred.
	Increase moisture content of material to lessen the ability for small particles to be carried off by the wind.
	Storage Pile heights must be lowered. Storage piles should be covered or enclosed whenever appropriate.
	Storage Piles which remain outside exposed to winds, must be chemically or physically stabilized.
	Reduce wind velocity in areas where materials are stored or handled, to lessen the likelihood of air transport of particles.
	Reduce frequency of disturbance of storage piles or open areas subject to fugitive emissions.
A-CM*	Install Add-On PM Control Equipment on the process equipment or series of processes (see discussion in previous section).
A-CM	Enclose the process line, to reduce likelihood of wind-borne fugitives escaping the processing operation.

Windblown Dust: Primary Control Measures

Control No.	Control Methods/Work Practices
CM-1	Pave, vegetate or chemically stabilize access points where unpaved traffic surfaces adjoin paved roads.
CM-14	Require revegetation, chemical stabilization, or other abatement of wind erodible soil, including lands subjected to water mining, resource recovery and abandoned construction sites.
A-CM	Take actions which would reduce the area of unprotected soil which is subject to disturbance.

* "A-CM" is an abbreviation for "alternate control measure".

Unpaved Industrial Roads: Primary Control Measures

Control No.	Control Methods/Work Practices
CM-1	Pave, vegetate or chemically stabilize access points where unpaved traffic surfaces adjoin paved roads.
CM-5	Prohibit permanent unpaved haul roads, and parking or staging areas at commercial, municipal, industrial or military facilities.
CM-6	Develop traffic reduction plans for unpaved roads.
CM-10	Pave or chemically stabilize unpaved roads.
CM-11	Pave, vegetate, or chemically stabilize unpaved parking areas.

Paved Industrial Roads: Primary Control Measures

It has been determined by various field studies, that dust emissions from paved industrial roads are a major component of ambient PM in the vicinity of industrial operations. Industrial site/type activities also apply to military sites. RACM can greatly reduce the PM_{10} emissions from vehicle travel on paved roads. The following measures should be implemented by stationary sources:

Control No.	Control Methods/Work Practices
CM-2	Require dust control plans for construction or land clearing projects (construction of paved roads).
CM-4	Provide rerouting or rapid clean-up of temporary sources of mud and dirt on paved roads.
CM-9	Require curbing and pave or stabilize shoulders of paved roads.
CM-13	Provide for storm water drainage to prevent water erosion onto paved roads.

Paved Industrial Roads: Alternate Control Measures

Control No.	Control Methods/Work Practices
A-CM	Surface cleaning of the roadways to prevent soil, product or any particle accumulation on roadways using the following methods: - Vacuum sweeping of the roadways - Water flushing, followed by sweeping.

Mobile Sources: Alternate Control Measures

Control No.	Control Methods/Work Practices
A-CM	Reduce traffic volume, vehicle miles traveled or trips per day on both paved and unpaved roads.
A-CM	Require trucks to maintain two feet of freeboard (eg. the distance between the top of the load and the top of the truck bed size.

Emission Reduction Potential of Selected Control Measures

The following discussion will detail the broad range of estimated emissions reductions which may be achieved by the selected control strategies in the PM_{10} SIP for the SVPA. In the categories discussed, it must be remembered that the percent reduction is the efficiency of the particular equipment not a percent reduction of the total emissions generated by that source. It remains to be determined, the extent source categories will be subject to each particular control measure.

New Source Review

Since the New Source Permit Program (NSPP) will affect only new stationary sources or existing ones undergoing modification, the resultant emission reduction that may be achieved from an unknown number of sources could not be adequately assessed. To date, the largest stationary source in the Trona Subplanning Area has already undergone an extensive modification, which appeared to accomplish a significant reduction in emissions from the 1987 emission inventory. It is expected that the NSPP will continue to assist the Trona Subplanning Area in realizing additional emission reductions. This plan will not claim any emission reduction credit from this control measure, because potential emission reductions cannot be quantified.

Add-On Particulate Control Devices

The control efficiency to be achieved from the various devices included in this category is generally very high, approximately 90-99%. The selected technologies and their control efficiencies are listed in Table IV-4.

TABLE IV-4

ADD-ON CONTROL METHODS AND THEIR EFFECTIVENESS

Control Equipment	Control Efficiency Percent[9] (%)
Fabric Filter Systems	99
Electrostatic Precipitators	90-99
Simple Cyclones	80
High Efficiency Cyclones	90-99
Wet Scrubbers	90-97

Enhanced Enforcement Program

Since adequate enforcement should be part of the regulatory program the USEPA will not allow any emission reduction be taken as a credit. However, if some of the permitted sources are out of compliance and/or fail their emission source test, this program could assist in reducing emissions. Such emission reductions from permitted sources may arise when the source is brought back into compliance or equipment is adjusted to successfully pass source testing. These emission reductions would represent a percent reduction of the normal operating inventory for the facility and, thus be a true net reduction in emissions. However, enhanced enforcement could also lead inspectors to discover additional equipment or operations which should be under permit but is not. With the placement of new permits, certain equipment may become subject to control technology and prescribed operating conditions in order to lessen PM_{10} emissions generated. This may or may not result in an overall reduction in PM_{10} emissions for the source and the region. In either case, the emission reduction percentage for this measure could not be assessed as it is not known what sources may be affected and how they will be affected. Thus, no emission reduction credit can be assigned to this measure despite the likelihood that emissions will be reduced.

Enhanced Variance Review

Variances exist because certain equipment is not capable of meeting its proper operating conditions pursuant to permit requirements, or select equipment has not been installed and excess emissions result. The use of such variances is generally very limited and may only occur occasionally, or on an emergency basis. The purpose of enhanced variance review is intended to provide a means whereby all the air districts represented in the SVPA will have knowledge of stationary source operations under variance that may affect the PM_{10} emissions impacting the region. Because this strategy is designed to be implemented for policy purposes rather than specific emission reductions, no credit for such reduction is being claimed. As needed, the air districts will devise appropriate methods to cooperatively notify each other of any variance subject to this provision.

Process Fugitives: Primary Control Measures

The equipment that can be installed on the process line, includes add-on PM devices which are described earlier in this chapter. The total emission control efficiency for this type of equipment and methodology for a category such as mineral processing has been estimated at 30-99 percent[19]. By contrast, the use of storage pile control and material handling techniques has a range of 40-90 percent control efficiency[20].

Windblown Dust at Industrial Open Area Sites

The selected control strategies are composed of both standard mitigative measures to reduce emissions from currently disturbed areas and preventative measures to preclude the creation of additional disturbed areas. While the preventative measures will reduce the emissions from open areas, the mitigative measures have a control efficiency of approximate 70 percent[21].

Unpaved Industrial Roads

There are different control efficiencies for the various measures which will be implemented for this source category and is detailed in Table IV-5. It should be noted, that the preventative measure would consist of prohibiting the permanent use of an unpaved road.

TABLE IV-5

UNPAVED ROAD CONTROL MEASURES AND THEIR CONTROL EFFICIENCIES

Primary Control Measures	**Control Efficiency Percent [22]**
Chemical Treatment of Roads	60
Paving of Roads	99
Prevent Unpaved Road Use	99
Vegetative Cover	70

Paved Industrial Roads

Collectively, emission reduction techniques for paved industrial roads indicate that approximately a 45 percent control efficiency[23] could be expected. The category of control strategies includes both primary controls measures (eg. stabilizing shoulders, pave access roads, etc...) and also alternate control measures (eg. surface cleaning of roadway by vacuum and water flushing). Estimates of the control efficiency of vacuum sweeping was estimated by USEPA[24] at 34 percent.

Mobile Sources at Industrial Sites

This is a difficult area to quantify, since it is unknown to what extent the control measure can be implemented. For this reason, it has been designated an alternate control measure and will not be relied on to achieve significant emission reductions. Therefore, no credit will be taken in this plan for any emission reduction that may be accomplished with the implementation of the identified techniques (eg. reduce traffic volume, reduce vehicle miles traveled, etc...).

Cost-Effectiveness of Selected Control Measures

At this time, it is unknown which operations will come under new or modified permits and operational parameters, therefore it is impossible to assess total cost benefits that will result from the implementation of a NSPP. At best, broad estimates can be made as to certain measure's cost-effectiveness.

Implementation Considerations

This section will only discuss certain aspects of implementation, while additional details will be revealed in the last section of this chapter. Table IV-6 provides a summary of the control categories and their anticipated date of implementation. This table also details what parties will be affected by the proposed controls and names the agency responsible for implementation.

The Enhanced Enforcement Program could be implemented within a very short period after the PM_{10} Plan adoption. However, full implementation may well require additional staffing.

It is anticipated that control measures for fugitive dust sources identified above will be developed into District rules, or city/county ordinances and proposed for adoption by December 1992, except for unpaved road controls which will be proposed for adoption by June 1993. The MDAQMD will be responsible for consulting with the local governing bodies in its jurisdiction, to effectuate the implementation of these provisions by the date specified in Table IV-6. The MDAQMD may delegate those duties/responsibilities to other agencies as is appropriate. Ultimate responsibility for achieving progress in meeting the emission reduction goals rest with the MDAQMD.

TABLE IV-6

SELECTED CONTROL STRATEGY AND SUGGESTED IMPLEMENTATION PLAN

Control Strategy Selected	Mechanism	Date	Agency	Affected Party
Enhanced Variance Review	Policies	12/91	MDAQMD	Industry/Military
New Source Review Permit Program	Regulation	6/92	MDAQMD	Industry/Military
Enhanced Enforcement Program	Policies	6/92	MDAQMD/Loc.Govt	Industry/Military
Const. & Demolition Controls	Rules	6/92	MDAQMD/Loc.Govt.	All Sources
Process Fugitive Controls	Rules	12/92	MDAQMD	Industry/Military
Wind Erosion Controls	Rules	12/92	MDAQMD/Loc.Govt.	All Sources
Paved Road Controls	Rules	12/92	MDAQMD/Loc.Govt.	All Sources
Open Area Source Controls	Rules	12/92	MDAQMD/Loc.Govt	All Sources
Unpaved Road Controls	Rules	6/93	MDAQMD/Loc.Govt.	All Sources
PM Control Devices	Regulation	12/93	MDAQMD	Industry/Military

4.3 Control of Construction & Demolition Activities

Background & Regulatory History of Selected Control Measures

Historically, some construction and demolition activities have been controlled on a limited basis in various jurisdictions through the use of conditions placed on grading and demolition permits. In addition, many air districts have nuisance abatement regulations which could be utilized to control excessive fugitive dust emissions from cleared lots. However, there are many other types of control methods that could be successfully implemented in order to achieve a systematic and progressive series of emission reductions in the SVPA. The following section will describe both the primary and alternate control measures which offer the most promise for a reasonable and effective approach to PM_{10} control.

Construction and demolition activities can be an important source of PM_{10} in urban areas. However, even rural areas can be adversely impacted when such activities are occurring at a number of local sites in close proximity. Depending on economic factors and population growth, existing structure demolition and/or new building construction can either be sporadic, or, in greater numbers, can contribute to an ever present PM_{10} problem. Emissions are generated by such activities as land clearing, cut and fill operations, blasting ground excavation and wind erosion of unprotected soil. Construction equipment activity and vehicles traffic on the site can also contribute a significant amount of PM_{10} emissions in this category. In addition, wind erosion of unprotected soil during land use development is another contributing element to the PM_{10} problem. Emissions generated will vary with the level of activity, the specific operation, the type of soil and the prevailing weather conditions. In total, the emissions generated may arise from any number of separate dust-generating operations at a site.

The type of construction or demolition project will determine what kind of specific activities are conducted. Commonly, construction activity will involve the building of structures (eg. residences, office buildings, etc...) sometimes in phases over an extended time period. Other common projects involve the building of roads, the laying of pipelines, and the creation of parking lots. These projects typically involve the following operations: land clearing, grading, drilling and blasting, excavation, cut and fill operations, operation of heavy moving equipment, and truck traffic on unpaved roadways.

Description of Control Measures for Construction/Demolition

As discussed earlier, a preference is placed on the prevention of PM_{10} emissions being generated rather than mitigative efforts. The control strategies involve modifying activities relating to land development with the goal of reducing both the amount and the potential emissions from disturbed soil. These measures are ideally implemented through the use of a dust control plan developed and submitted by the party responsible for the project. The dust control plan will be comprehensive in scope and shall include all necessary measures that will ensure sufficient control of PM_{10} emissions.

Construction/Demolition Activities: Primary Control Measures

Control No.	Control Methods/Work Practices
CM-2	Require dust control plans for construction or land clearing projects (including road projects).
CM-3	Require haul trucks to be covered.
CM-4	Provide rerouting or rapid clean-up of temporary sources of mud and dirt on unpaved roads.
CM-12	Require dust control measures for material storage piles.
CM-13	Provide for storm water drainage to prevent water erosion onto paved roads.
CM-14	Require revegetation, chemical stabilization, or other abatement of wind erodible soil.

Construction/Demolition Activities:
Alternate Control Measures to Modify Development Practices

Control No.	Control Methods/Work Practices
A-CM	Do not allow grading of lot or parcel until a building permit has been issued.
A-CM	Wherever possible, maintain the natural topography to eliminate the need for extensive land clearing, blasting, ground excavation, grading and cut and fill operations.
A-CM	Wherever feasible, require parking lots and paved roads (including access roads) to be constructed first.
A-CM	In a multi-phase project, build the first phase upwind (based on area's prevailing wind direction) of the remaining project, whenever feasible.
A-CM	Establish wind breaks, either man-made structures or vegetative on the perimeter of development sites when a site is left with unprotected soil for an extended period.

Construction/Demolition Activities:
Alternate Control Measures to Modify Work Practices

Control No.	Control Methods/Work Practices
A-CM	All grading activities would cease during periods of high wind (i. greater than miles per hour).
A-CM	Require trucks hauling dirt, sand, soil or other materials capable of fugitive emissions be covered.
A-CM	As soon as construction and initial landscaping are completed, the soil should be treated with chemical soil and dust binders, followed by seeding and/or restoration of vegetation.
A-CM	Avoid soil/mud deposition by truck on roadways beyond facility boundaries.

Emission Reduction Potential of Selected Control Measures

As discussed above, there are a multitude of control measures considered appropriate for use on construction and demolition sources within the SVPA. For the purposes of devising a comprehensive control strategy "dust control plan", only the basic primary control measures will be considered. This approach shall include an overall estimate of the emission reduction potential of those essential measures which will serve as foundation strategy for controlling construction/demolition activities. South Coast Air Quality Management District (AQMD) estimated that each of the primary control measures listed below in Table IV-7 could realize a 50 percent reduction[25] in emissions.

TABLE IV-7

CONSTRUCTION/DEMOLITION CONTROL MEASURES AND THEIR CONTROL EFFICIENCIES

Primary Control Measures	Control Efficiencies Percent
Haul Trucks to be covered	50
Pave Roads on Cont. Site	50
Pave Const. Access Roads	45
Watering of Unpaved Surfaces	50
Restore Vegetative Cover	50
Cease Grading Activities	50
Rerouting or Rapid Clean-Up Roads	45

Cost-Effectiveness of Selected Control Measures

A cost-effectiveness assessment has been made for only those primary control measures identified above. The South Coast AQMD reports that a group of measures including: (1) early paving of construction roads; (2) sand/dirt removal from paved roads; (3) chemical treatment of road shoulders has a cost-effectiveness of approximately $575 per ton of emissions reduced. In addition, the primary measures for construction activities has been determined by the South Coast AQMD to have a combined cost-effectiveness value of $663 per ton of emission reduced[26].

Implementation Considerations

These measures can be readily implemented as they largely involve modifying operational practices with respect to the way land is routinely developed. In addition, no special technology is necessary to incorporate these changes into the different type of land development.

By June of 1992, it is expected either the MDAQMD or the local governments will adopt regulations to require that these measures be implemented on construction projects within the SVPA. The submission of dust control plans will be required and handled according to the needs of the local jurisdictions. The details will be discussed more fully in a later section which discusses the individual county approaches to the SVPA PM_{10} problem.

4.4 Control of Emissions from Unpaved Roads

This source category is a frequent subject of citizen complaints to air districts. In rural areas with sandy/silty soil PM emissions can readily be seen with the passage of a single vehicle on an unpaved road. Typically, the extent of the problem depends on the vehicle speed and vehicle miles traveled (VMT) per year, silt content of the soil, and frequency of precipitation. In the SVPA, the concern over unpaved roads focuses mainly on localized areas where development of residence are occurring along unpaved roads. Since the best method of control is to pave the roadway, it could be prohibitively expensive to pave every a single road in the entire SVPA. Thus a localized paving approach may offer the best method to substantially reduce emissions in a populated rural area and significantly improve the local air quality. While in areas where paving is not reasonable, there are other methods of controlling emissions that can be employed as secondary choices.

Description of Control Measures for Unpaved Roads

Unpaved Roads: Primary Control Measures

The single most important control measure for an unpaved travel surface would be paving with an acceptable material such as concrete, asphalt and gravel. This method along with a prohibition of permanent unpaved roads would effectively reduce the source. Paving materials should consist of concrete, asphalt, gravel, or some acceptable substitute. However, a standard control measure may not always be readily employed because of environmental or economic reasons. This plan places an emphasis on the implementation of primary control measures, which includes the following:

Control No.	Control Methods/Work Practices
A-CM	Pave, vegetate or chemically stabilize access points where unpaved traffic surfaces adjoin paved roads.
CM-5	Prohibit permanent unpaved haul roads, and parking or staging areas at commercial, municipal, industrial or military facilities.
CM-10	Paving or chemically stabilizing the unpaved areas.
CM-11	Pave, vegetate, or chemically stabilize unpaved parking areas.

Unpaved Roads: Mitigation Measures

There are mitigating measures which would reduce the existing amount of emissions currently being generated. These should be implemented if paving the roadway would cause some significant environmental impacts, or is found to be prohibitive for economic reasons by the local jurisdictions. The emission reductions to be achieved under this type of control strategy depends in part on the traffic characterization of the road. Mitigation measures are as follows.

For roadways with moderate to high vehicular use:

1. Develop traffic reduction plans for unpaved roads.

2. Lower the vehicle speed limit on unpaved roads and implement a routine proactive enforcement program to monitor compliance with the speed limits.

3. Limit the size and weight of vehicles permitted on certain unpaved road or areas.

4. Surface the roadway with a material of lower silt content, coupled with a planned maintenance program.

For roadways with low vehicular use:

1. For temporary construction sites or special events with vehicular maneuvering areas, use wet suppression (eg. watering the road or parking lot).

2. Use chemical stabilization on the roadway surface.

3. Use physical stabilization of the soil.

4. Plant windbreaks next to the roadway.

Emission Reduction Potential of Selected Control Measures

Paving as a control measure is highly effective, and it has been estimated treatment of unpaved roads can achieve a 90 percent reduction in PM_{10} emissions. While collectively, the other measures may achieve approximately a 50 percent reduction in PM_{10} emissions. See Table IV-8 for details on individual measures to be implemented.

TABLE IV-8

UNPAVED ROAD CONTROL MEASURES AND THEIR CONTROL EFFICIENCIES

Primary Control Measures	Control Efficiency Percent [27]
Chemical Treatment of Roads	60
Paving of Roads	99
Prohibit Unpaved Road Use	99
Vegetative Cover	70

Cost-Effectiveness of Selected Control Measures

The cost effectiveness analysis prepared for unpaved road control has been well documented by other air districts. Table IV-9 shown below will summarize the determinations that have been developed to date for primary control measures and also an alternate measure ("tree windbreaks").

TABLE IV-9

COST-EFFECTIVENESS OF UNPAVED ROAD CONTROL MEASURES

Primary Control Measures	Cost-Effectiveness[28]
Paving of the Unpaved Road	$ 6201/ton
Chemical Treatment of Unpaved Roads	$ 693/ton
Paving Parking Lots	$ 1,078/ton
Watering of Site	$ 663/ton
Tree Windbreaks next to the Roadway	$ 409/ton

Implementation Considerations

All roadways subject to this measure should be identified by the local governments in consultation with the MDAQMD. A priority assessment shall be made relative to the relative needs and feasibility of paving each road segment. By June 30, 1992, the local jurisdictions shall have devised and approved an equitable program to systematically control the emissions from the selected unpaved roads. By December 31, 1992, the local governments shall have identified 50 percent of the targeted roads and have paved or treated. If roads are treated they shall continue to be treated with one of the above recommended control techniques indefinitely, or until paved at some future time.

4.5 Control of Emissions from Paved Roads

Background & Regulatory History

Paved Roads have long been subject to standard control measures which consisted mainly of sweeping and water flushing. Indeed, it is still almost exclusively a primary control measure. However, there is still the emphasis that preventative measures are more important than mitigation measures which these represent. In the case of public roadways near industrial areas and traveled by heavy trucks, there is the consideration that they may best be addressed by treating them as if they were industrial roads.

Emission from Paved Roads

This section of the plan will discuss the control of PM_{10} emissions from public rather than industrial roads. This distinction is necessary because of the difference in surface loading characteristics, emission levels, traffic patterns, and viable control options. Particulate emissions occur whenever a vehicle travels over a paved surface such as parking lots, public and industrial roads. These emissions may originate from material previously deposited on the travel surface (from spills and storm water run-off), or re-suspension of material from tires and vehicle undercarriages.

In general, public roads exhibit lower surface loading than industrial roads, yet the traffic volume may be much higher, thus leading to a substantial contribution to the measured air emission. In some cases, such as the SVPA, public roads in industrial areas may be heavily loaded (with soil deposition) and traveled by heavy vehicles. Therefore, the control strategy may be better suited to treating these roads as industrial roads.

Description of Control Measures for Paved Roads

Preventative Control Measures

Control No.	Control Methods/Work Practices
CM-4	Provide rerouting or rapid clean-up of temporary sources of dust on paved roads.
CM-9	Require curbing and pave or stabilize shoulders of paved roads.
CM-13	Provide for storm water drainage to prevent water erosion onto paved roads.

Paved Roads: Alternate Control Measures

Control No.	Control Methods/Work Practices
A-CM	Surface cleaning of the roadways to prevent silt loading using the following methods; Vacuum sweeping of the roadways Water flushing, followed by sweeping

Emission Reduction Potential of Selected Control Measures

Collectively, emission reduction techniques for paved public roads indicate that approximately a 45 percent control efficiency[29] could be expected. The category of control strategies includes both primary controls measures (eg. stabilizing shoulders, pave access roads, etc...) and also alternate control measures (eg. surface cleaning of roadway by vacuum and water flushing). Estimates of the control efficiency of vacuum sweeping was estimated by the USEPA[30] at 34 percent.

Cost-Effectiveness of Selected Control Measures

South Coast AQMD determined the cost-effectiveness of a several measures designed to reduce dust from build-up on the roadways. This was summarized to be $575/ton (in 1990) for the combined measures (eg. removal of accumulated dirt, chemical treatment of road shoulders, etc...). In the USEPA guidance document[31], it was noted that the cost of a vacuum sweeper was estimated in 1980 to cost $72,00 with an estimated 5 year life expectancy for the equipment. Annual operating costs were estimated to equal approximately $214,000.

Implementation Considerations

All roadways subject to this measure should be identified by the local governments in consultation with the MDAQMD. This will result in an assessment to prioritize which roadways shall be controlled. It is suggested that all public and private industrial roadways in the urban areas be targeted for control. A systematic program shall be devised which establishes the most effective control measures to be implemented on at least 50 percent of the roadways by December 31, 1992. By December 31, 1993, the local governments shall have implemented the devised control program on the remaining roadways subject to the plan.

4.6 Control of Emissions from Open Area Wind Erosion Sources

Background and Regulatory History

It is not unusual to see the adverse impacts of windblown dust on the residents of the SVPA. There are public complaints of fugitive dust emissions which can arise from a variety sources. Historically, the MDAQMD has been able to address specific problem areas on a case-by-case basis. This has been accomplished through the enforcement of the provisions contained in a nuisance rule. Then again, for individual problem sites some were amenable to specific solutions which were implemented on a case-by-case basis. The extent of the PM_{10} problem in the SVPA calls for a more formalized and comprehensive approach.

It is apparent that problem sources must be consistently controlled and monitored. Previously, some sources completely escaped the District's scrutiny by being exempted from any control whatsoever. There are a number of measures which can aid in reducing PM emissions from open areas subject to wind erosion.

Open Area Wind Sources

In the SVPA, a considerable amount of land does not have existing vegetation. It is readily seen, that fugitive dust emissions may arise from wind erosion on open areas of exposed ground. This is usually caused by human activities which disrupt the native integrity of the desert soil crust. Activities that cause soil disturbances can include property grading, agricultural practices, off-road vehicle use, industrial operations and pipeline placement. It is a common practice to clear the land of native vegetation, leaving the land especially vulnerable to the effects of wind erosion. There is also the incidence of blowing dust which sometimes occurs from dry lakebeds, such as found at Searles Valley Lake. However, native soil will generally remain fairly stable if left undisturbed. This section of the plan will detail a few critical measures which can assist in reducing PM_{10} emissions on open area.

Description of Control Measures

Control No.	Control Methods/Work Practices
CM-7	Limit use of recreational vehicles on open land.
CM-14	Require revegetation, chemical stabilization, or other abatement of wind erodible soil.
CM-15	Rely upon the soil conservation requirements of the Food Security Act to reduce emissions from agricultural operations.

The PM_{10} Plan promotes prevention rather than mitigation measures. Thus, a ban of off-road vehicles would ensure that those fugitive emissions are not created by disturbing the landscape. However, short of that it is important to control the emissions that is generated by off-road vehicle in circumstances which may be limited by control of locations, vehicle speed, use of dust palliatives. Furthermore, it is important to emphasize permanent or semi-permanent control efforts such as the use of revegetation to "reclaim" areas subject to wind erosion. Administratively, agencies responsible for the control measure implementation should place a premium on control methods which maximizes the protection of the environment.

Emission Reduction Potential of Selected Control Measures

It is difficult to assess the emission reduction potential that these selected control measures offer. A total ban on the use of off-road vehicles in the Bureau of Land Management (BLM) parklands would amount to a 100 percent reduction. However, less restrictive prohibitions on the use of off-road vehicles would proportionately provide less reductions. The use of paving such areas as parking lots can result in as much as 99 percent emission reductions. Additionally, South Coast AQMD has estimated that such control measures as stabilizing disturbed soil through the use of chemical applications, vegetative covers and snow fencing can achieve 70 percent reduction in fugitive dust, and that windbreaks have an efficiency range of 15-18 percent although only 3.8 percent during the first 3 years is achievable due to the immaturity of the trees.

Cost-Effectiveness of Selected Control Measures

The cost effectiveness of control measures for open area sources of fugitive dust has been well documented. South Coast AQMD has reported the cost-effectiveness of a number of the measures which were intended for implementation in the Coachella Valley. Some of these have been included in Table IV-10.

TABLE IV-10

COST EFFECTIVENESS OF OPEN AREA CONTROL MEASURES[32]

Primary Control Measures	Cost-Effectiveness (Cost Per Ton)
Magnesium Chloride Stabilizer	**$ 1,073**
Copolymer Chem. Stabilizer	$ 810
Paving Parking Lots	$ 1,078
Snow Fence Windbreaks	$ 281
Tree Windbreaks	$ 409
Vegetative Planting	$ 532

Implementation Considerations

These control measures may be instituted by District rules and/or ordinances from the local jurisdictions. The actual size of the open area that must be controlled will be dependent on the each particular jurisdiction's design day and the amount of reductions needed. In addition, there must be a fundamental policy decision which determines the extent to which private land would be subject to these selected control measures.

Also, there must be established along with these determinations a mechanism by which implementation efforts must be monitored and evaluated for success. This may necessitate the creation of dust control plans for areas to be controlled, which may have to be filed by individuals or public agencies with the District having jurisdiction over such area.

4.7 Specific Reasonably Available (and Alternate) Control Measures

Selected RACM and alternate RACM discussed below will be implemented by the PM_{10} Regulation for the SVPA, which is anticipated to be developed, adopted and partially implemented by December 10, 1993. The proposed PM_{10} Regulation describes "Alternative PM_{10} Control Plans" (ACPs), which will allow flexibility in satisfying the requirements of the Regulation. These ACPs are required to result in equivalent emission reductions in controlled source categories, and may lead to alternative implementation measures than the ones specified in this section. Implementation of the following measures is the responsibility of the District, BLM, San Bernardino County, North American Chemical Company (NACC), and Pacific Salt. Federal RACM are indicated by CM with a numerical suffix; Alternate (or state suggested) control measures are indicated by A-CM. Detailed emission reduction calculations are presented in Appendix I.

Industrial Fugitives:

This control measure is intended to reduce incidental emissions resulting from industrial operations, a group of emissions that includes wind erosion from disturbed industrial areas, wind erosion of storage piles, material losses from process lines, and material track-in from unpaved areas.

RACM: Enclose Process Lines (A-CM)
Lower Bulk Material Storage Piles (CM-12)
Cover Bulk Material Haul trucks (CM-3, A-CM)
Rapidly Clean up Bulk Material Spills
Pave, Chemically Stabilize or Vegetate Unpaved Road Access Points (CM-1)
Rapidly Clean up Tracked-in Bulk Material

Source Description: Coal loading, storage piles, holding ponds, and 600 acres of plant area at various silt contents producing 0.56 tons of PM_{10} per day in 1994.

Control Requirement: Implementation of above RACM sufficient to provide a minimum 20% reduction in PM_{10} emissions from industrial fugitives.

Variables Controlled: Silt content of disturbed areas and amount of exposed disturbed area.

Capital Cost Items: Undetermined

Implementation Cost: Undetermined

Cost Effectiveness: Undetermined

Funding Source: Affected sources (NACC and Pacific Salt)

Enforcement: Site inspection, permitting

1994 Emission Reductions: 0.11 tons of PM_{10} per day

Construction/Demolition:

This control measure is intended to reduce emissions resulting from construction and demolition activities, specifically grading, excavation, loading, crushing, cutting, planing, shaping and ground breaking.

RACM: Require Dust Control Plans for construction/demolition projects (CM-2)
Maintain Natural Topography (A-CM)
Construct Parking Lots and Paved Roads First (A-CM)
Construct Upwind Portions of Project First (A-CM)
Cover Haul Trucks (CM-3, A-CM)

Source Description: Construction/demolition activities disturb 90 acres per year, producing 0.65 tons of PM_{10} per day in 1994.

Control Requirement: Construction/Demolition operations shall prepare a Dust Control Plan incorporating the above RACM to provide a minimum 20% reduction in emissions from construction/demolition activities.

Variable Controlled: Disturbed area

Capital Cost Items: Undetermined

Implementation Cost: Undetermined

Cost Effectiveness: Undetermined

Funding Source: Affected sources (owners/operators)

Enforcement: Dust Control Plan (permitting), site inspection

1994 Emission Reductions: 0.13 tons of PM_{10} per day

Public Unpaved Road Dust:

This control measure is intended to reduce emissions from activity on BLM land, specifically vehicular traffic, off-road activity, and disturbed area wind erosion.

RACM: Pave or chemically stabilize access points where unpaved traffic surfaces adjoin paved roads (CM-1)
Develop traffic reduction plans for unpaved roads (CM-6)
Limit use of recreational vehicles on open land (CM-7)
Pave, chemically stabilize or vegetate disturbed areas (CM-11)

Source Description: Approximately 17 miles of unpaved BLM roads with approximately ten trips per day and an undetermined number of tracks for recreational vehicles.

Control Requirements: A 20% reduction in emissions from BLM areas through: Designation of a limited number of staging areas for competitive or organized recreational vehicle events; limited treatment of some heavily used staging areas to minimize occasional dust impacts; closure and rehabilitation of a limited number of vehicle routes in the Ridgecrest area; treatment of certain unpaved/paved road/track interfaces to limit dust entrainment; and improved erosion control in certain disturbed areas to minimize dust entrainment.

Variables Controlled: Area disturbed, silt content - vehicle entrainment of dust.

Capital Cost Items: Undetermined

Implementation Cost: Undetermined

Funding Source: Bureau of Land Management (BLM)

Enforcement: Site inspection, permitting

1994 Emission Reductions: 0.15 tons of PM_{10} per day

Industrial Roads:

This control measure is intended to reduce emissions resulting from industrial activity on roads within industrial facility property lines and those roads on Searles Dry Lake.

RACM: Chemical Stabilization of Heavily Travelled Private Unpaved Roads (CM-5, CM-10)

Source Description: Heavily traveled industrial roads which specifically comprise: (1) approximately 20 miles of roads on Searles Dry Lake; and (2) Trona, Argus & Westend roads (including staging and loading/unloading areas) which combined, is equivalent in area to 1.75 miles of a road 25 feet wide. Road characteristics affecting fugitive dust generation include: surface silt loadings ranging from 0.58 to 20.53 ounces per square yard; mix of vehicle and equipment use; and mix of speeds (5 mph up to 35 mph); which combined will result in these roads generating 4.78 tons of PM_{10} per day in 1994.

Control Requirement: One mile of heavily travelled plant road to be chemically stabilized or otherwise controlled equivalent to a 85% control level; 8 miles of Lake roads to be chemically treated with salt (road surface silt loading of 0.17 ounces per square yard); 12 miles of Lake roads to be watered periodically (road surface silt loading of 0.58 ounces per square yard).

Variable Controlled: Road surface silt loading - vehicle entrainment of dust.

Capital Cost Items: Using "Control of Open Fugitive Dust Sources" and "Fugitive Dust Background Document and Technical Information Document for BACM" (USEPA 1988 and USEPA 1992), the following estimates for plant road treatment were made: treatment materials, fuel, labor, equipment maintenance = $3,000 per mile of road treated per treatment; or $15,000 per mile of road treated per year (for five annual treatments). Salt paving costs include salt, fuel, labor, and maintenance = $3,000 per mile salt treated per year or $24,000 for eight miles in 1994. Watering costs include capital costs, fuel, water, truck maintenance, and operator labor = $58,000 per year per truck or $174,000 for three trucks on the lake (lake road salt treatment and watering costs estimated by NACC in personal communication 9/1993).

Implementation Cost: $15,000 (plant) plus $24,000 and $174,000 (lake) or $213,000 per year

Cost Effectiveness: $351 per ton or $0.18 per pound of PM_{10} reduced

Funding Source: Affected sources (North American Chemical Company and Pacific Salt)

Enforcement: Site inspection, permitting

1994 Emission Reductions: 1.66 tons of PM_{10} per day

Public Disturbed Areas:

This control measure is intended to reduce emissions resulting from the disturbance of soil by daily activities.

RACM: Stabilization of Public Disturbed Areas (CM-11, CM-14)

Source Description: Area equivalent to 210 acres of public, small scale commercial and residential areas are disturbed on a daily basis, producing 3.42 tpd of PM_{10}. These include unpaved shoulders of paved roads, unpaved parking lots, unpaved residential driveways, the Trona railyard, and the Trona municipal landfill.

Control Requirement: At least 69 acres of disturbed open areas shall be treated at a 90% control level.

Variable Controlled: Erodibility of exposed surface.

Capital Cost Items: Chemical stabilizer suppliers (MIS 93 and SSP 93) estimate 90% control equivalent can be obtained at an applied cost of five cents per square foot, including product, labor and equipment costs. Cost per acre: $2200.

Implementation Cost: $152,000

Cost Effectiveness: $434 per ton or $0.22 per pound of PM_{10} reduced

Funding Source: USEPA 105 grant pass-through funding/alternate District funding mechanisms

Enforcement: Site inspection, permitting

1994 Emission Reductions: 0.96 tons of PM_{10} per day

TABLE IV-11

PM_{10} REGULATION/CEQA DEVELOPMENT AND ADOPTION SCHEDULE

Action	Adopted
Rule 403.1 (Respirable Particulate Matter)	6/22/94

CHAPTER V

ATTAINMENT DEMONSTRATION

5.1 Introduction

This chapter details the methodology used in demonstrating PM_{10} emission reductions resulting in the attainment of both the 24-hour and annual Federal PM_{10} Standards by December 31, 1994. This demonstration is predicated upon the successful implementation of all appropriate control measures. According to USEPA's policy regarding attainment demonstrations for initial Moderate PM_{10} nonattainment areas (which are those designated nonattainment upon enactment of the Federal Clean Air Act Amendment of 1990), and by the operation of law classified as Moderate upon enactment. This policy supplements previous USEPA's attainment demonstration guidance which is documented in the PM_{10} SIP Demonstration Guidance (June 1987. The (Revised) Guidance on Air Quality Models (July 1990) limits application to Moderate PM_{10} nonattainment area designated nonattainment at enactment, and shall have November 15, 1991 as deadline for submittal of PM_{10} attainment demonstration and other SIP requirements.

To demonstrate if recommended control measures will reduce PM_{10} emissions sufficiently to meet the required Federal PM_{10} Standards, the USEPA (1987) specifies three air quality modeling options, which are the following:

(1) Use of a combination of Receptor and Dispersion models;
(2) Use of Dispersion model alone; or
(3) Use of two receptor models with control strategies developed using a proportional model (Linear Roll-back Model).

The choice of model used in demonstrating PM_{10} attainment was carefully evaluated based on the USEPA guidance on PM_{10} models. Since fugitive dust accounts for a significant portion of all PM_{10} emissions in the SVPA, combined with a variety of point and area sources, a Linear Roll-Back (LR3) model was selected which is consistent with the USEPA option (3).

Additionally, during the preparation of this Plan and in determining the appropriate design value for the Trona Subplanning Area, in view of the unreliable emission data used, a decision was made to conduct a dispersion modeling analysis. This analysis will provide a more credible information for future planning purposes. The results of the analysis will be used to revise the percent of emission reductions required for the various contributing sources within the Trona Subplanning Area. Therefore, the attainment projections illustrated in Table V-1 maybe revised one way or the other based on the design values obtained from the dispersion modeling analysis. Consequently, the attainment goals for the Trona Subplanning Area will focus on the level of reduction shown in Table V-1 until such studies and revisions to the Plan are completed.

5.2 Attainment Demonstration Using Linear Roll-Back Model

The Linear Roll-Back model is used to analyze the effect of control strategy. This approach is applied to determine the extent of reduction that is necessary for each of the design days and locations. An evaluation was made for the Trona. Subplanning areas and is summarized in Table V-1.

Trona Subplanning Area: Attainment

PM_{10} emissions in the Trona region come from a wide range of sources. As mentioned in the preceding chapters, December 19, 1990 is the design day selected to analyze the proposed control scenario. Evaluation of the available data suggests that the most effective attainment strategy involves reducing emissions from Industrial Fugitives, Construction/Demolition Activities, Public Unpaved Roads, Industrial Roads, and Public Disturbed Areas. Table V-1 demonstrates the emissions reductions required to reach attainment in the Trona Subplanning area by December 31, 1994. Control Level reflects the emission reductions expected from control measures implemented within the indicated source category.

TABLE V-1

TRONA DESIGN DAY CARRYING CAPACITY CALCULATION
Design Day is December 19, 1990

$$\text{Carrying Capacity} = \frac{\text{Design Day Emissions * Concentration Standard}}{\text{Design Day Concentration}}$$

12.11 * 150/228 = 7.97 tons per day Carrying Capacity

Source Category	Actual 1990 Emissions	Projected 1994 Emissions	Control Level	1994 Emissions After Controls
Fuel Combustion	0.06	0.07		0.07
NACC Stacks	2.12	1.08		1.08
NACC Fugitives	0.45	0.56	20%	0.45
Const./Demo.	0.60	0.65	20%	0.52
Paved Road Dust	0.17	0.17		0.17
Unpaved Road Dust	0.75	0.75	20%	0.60
Industrial Road Dust	4.43	4.16	40%	2.50
Pub. Dist. Areas	3.42	3.42	28%	2.46
Unplanned Fires	0.01	0.01		0.01
Mobile Sources	0.10	0.10		0.10
	12.11	10.97		7.96

Note: Emissions based on Trona portion of Searles Valley Planning Area, 1990.

5.3 Air Quality Maintenance & Contingency Measures

Air Quality Maintenance Requirements

Section 189(c) of the 1990 FCAA requires that SIP's include quantitative milestones which are to be achieved every 3 years until the area is redesignated attainment and which demonstrate Reasonable Further Progress (RFP) toward attainment by the applicable date. In addition, before an area can be redesignated to attainment the USEPA must have determined that the area, among other things, has attained the PM_{10} NAAQS and must have approved a maintenance plan for the area meeting the requirements of section 175A.

To demonstrate RFP, it must be demonstrated that the SIP measures are being implemented and the milestones have been met within 90 days after the milestone due date. Because of the length of time that it may take to determine whether an area has attained the standards, the USEPA recommends that the PM_{10} plans demonstrate maintenance of the PM_{10} standards for at least 3 years beyond the attainment date.

Contingency Measure Requirements

Section 172(c)(9) of the 1990 FCAA requires a Moderate area SIP to contain contingency measures that must be implemented if the area fails to make RFP or to attain the primary standards by the applicable date. However, this section does not specify the number of contingency measures to be adopted or the magnitude of emission reductions to be achieved.

The USEPA has stated that the contingency measures to be implemented if an area does not attain the standards on schedule should be a portion of the actual emissions reductions required by the SIP control strategy to bring about attainment. It was suggested, that the contingency emission reductions should be approximately equal to the emission reductions necessary to demonstrate attainment for one year. This could be represented by approximately a 25 percent reduction of the total emissions targeted for reduction in a 3-4 year period.

The contingency measures should consist of other available control measures beyond those required to attain the standards and may go beyond RACM. The USEPA affirmatively states it is important not to allow a contingency measures to mitigate the need for an adequate and appropriate control strategy demonstration. Thus, the plan should gain attainment with the outlined primary control strategy and not rely on contingency measures to achieve attainment.

Additionally, the identified contingency measures must be implemented immediately after the USEPA determined the area has failed to make RFP or meet attainment. This ensures that contingency measures will become immediately effective without further legislative action, once USEPA takes such action.

Trona Subplanning Area: Contingency Measures

The control strategy outlined by this plan requires a stringent level of control from those source categories which need to be controlled. The required emission reductions range from 40-60%, and to achieve an additional 25% will be difficult. Therefore, if implementation of the SIP control measures do not achieve attainment of the federal PM_{10} standards in the SVPA by December 31, 1994, it may become necessary for the District to implement contingency measures.

The District is required to develop and implement contingency measures that achieve PM_{10} emissions reductions of at least 0.75 tpd no later than December 31, 1995, if the District does not demonstrate RFP or attain the federal PM_{10} standard, or if any exceedance of the federal PM_{10} standard is recorded prior to December 31, 1995.

Public Disturbed Areas: This contingency measure is intended to reduce emissions resulting from the disturbance of soil by daily activities.

RACM: Stabilization of Public Disturbed Areas (CM-11, CM-14)

Source Description: Area equivalent to 210 acres of public, small scale commercial and residential areas are disturbed on a daily basis, producing 3.42 tpd of PM_{10}. These include unpaved shoulders of paved roads, unpaved parking lots, unpaved residential driveways, the Trona railyard, and the Trona municipal landfill. The control strategy RACM for stabilization of public disturbed areas targeted 69 acres of the 210 acres of disturbed open areas in the SVPA (Refer to Chapter IV). This contingency measure targets an additional 46 acres of disturbed open areas to achieve 0.75 tpd of PM_{10} emissions reductions.

Control Requirement: At least 46 additional acres of disturbed open areas shall be treated at a 90% control level.

Variable Controlled: Erodibility of exposed surface.

Capital Cost Items: Chemical stabilizer suppliers (MIS 93 and SSP 93) estimate 90% control equivalent can be obtained at an applied cost of five cents per square foot, including product, labor and equipment costs. Cost per acre: $2200.

Implementation Cost: $101,200

Cost Effectiveness: $370 per ton or $0.19 per pound of PM_{10} reduced

Funding Source: USEPA 105 grant pass-through funding/alternate District funding mechanisms

Enforcement: Site inspection, permitting

1995 Emission Reductions: 0.75 tons of PM_{10} per day

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